the OIL AND GAS JOURNAL

Thru the Ages with Hughes Rock Bits

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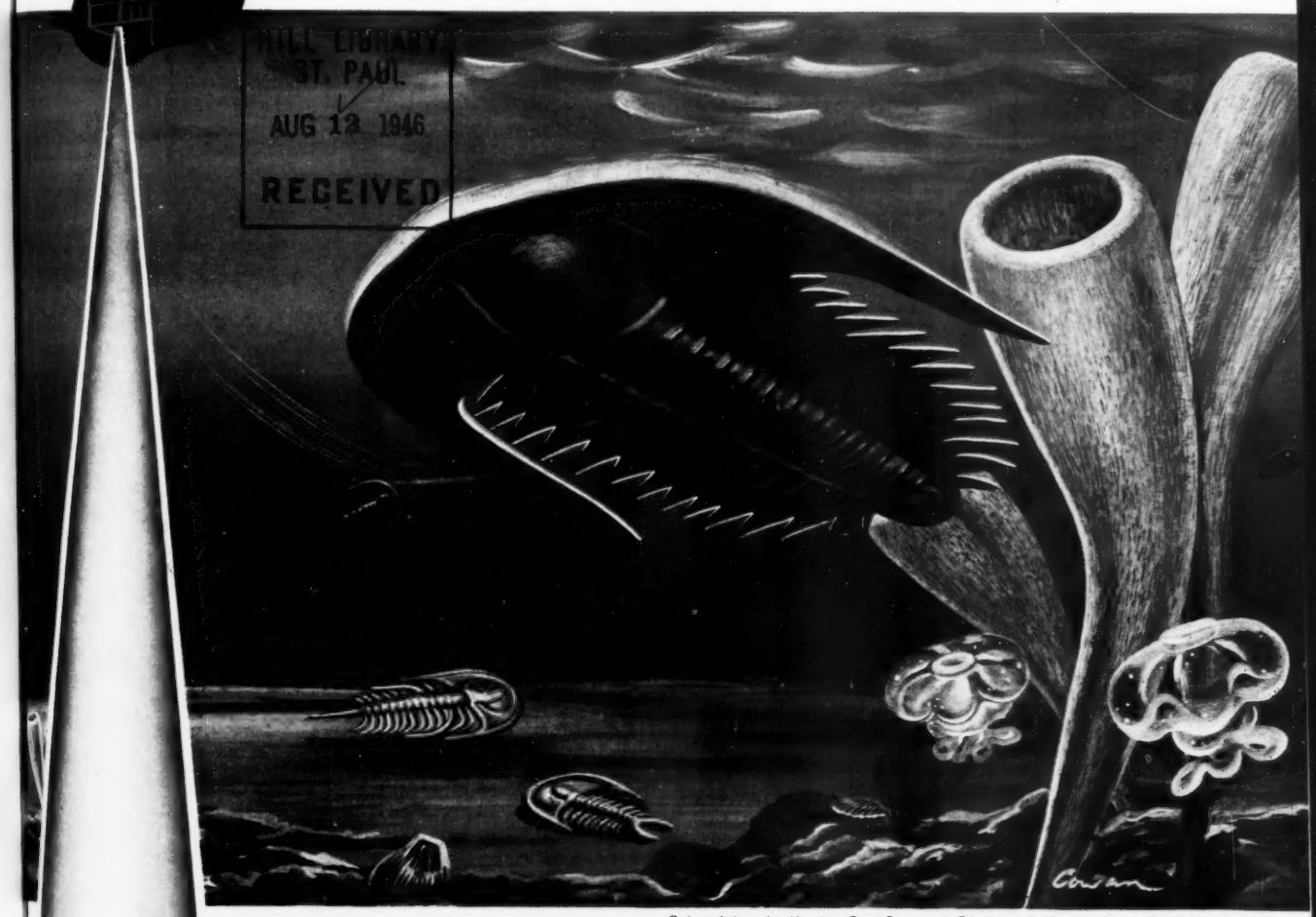


Painted for the Hughes Tool Research Division Collection by John Pemberton Cowan

The Cambrian period includes the oldest geological strata where there is an abundance of fossils. Depicted above are Trilobites, Sponges, Corals, Jellyfish, and Brachiopods as they appeared in their natural habitat on the shallow ocean floor.*

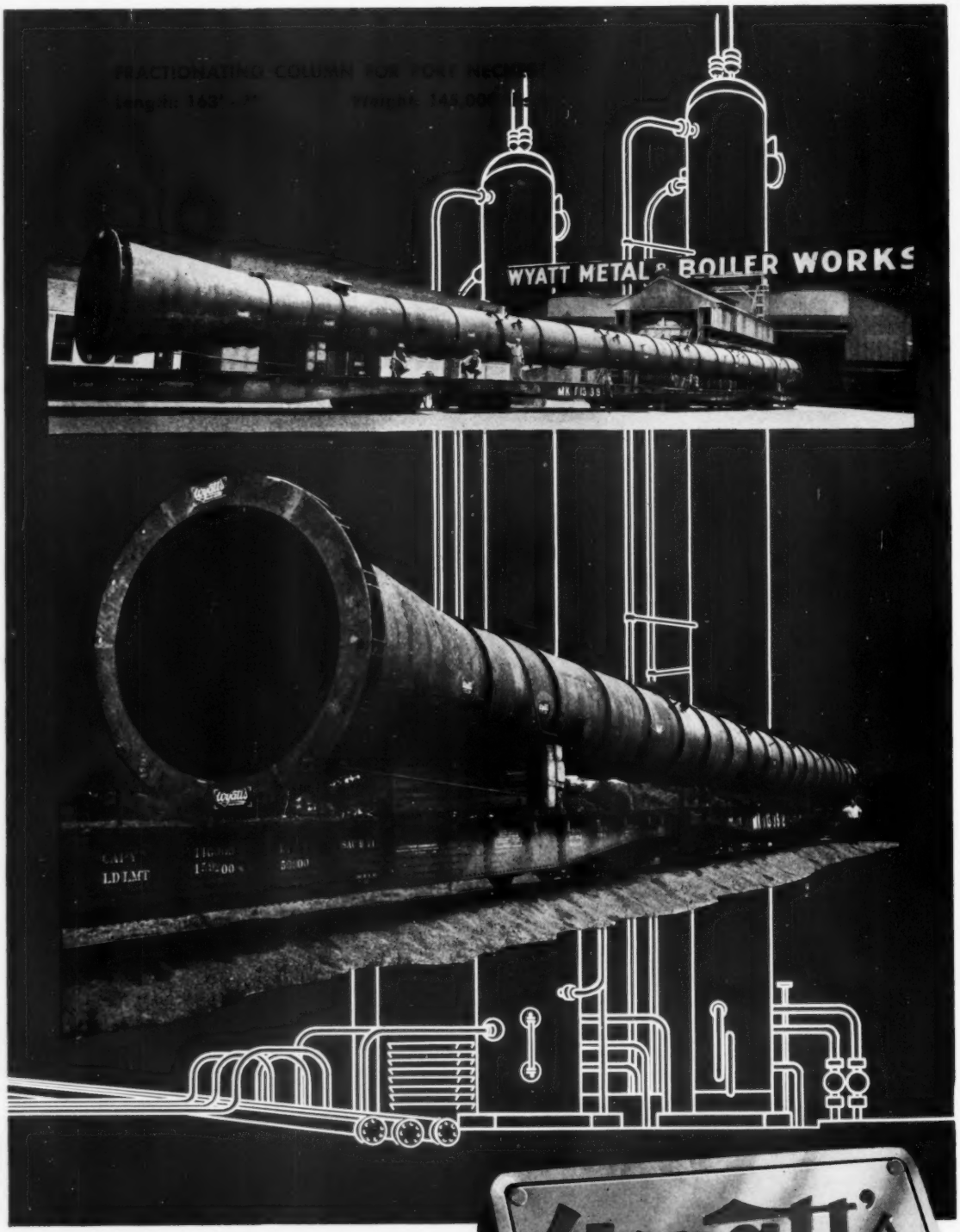
*Full-size color prints of this original painting will be sent upon request.

For millions of years Nature compressed protective rock barriers over its buried oil treasures. The Hughes rock bit unlocked these gigantic stone vaults, revolutionized an industry, and accelerated the industrial age.

In drilling tough Cambrian dolomites, chert, and quartzitic sandstones, specify Hughes W7R rock bit for straight hole, maximum speed and maximum footage at minimum cost.

Hughes TOOL COMPANY HOUSTON, TEXAS

Standard of the Industry



Fabricating towers to rigid specifications for modern petroleum refining requires technical "know-how" gained from years of experience plus proved methods and superior plant facilities.

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WYATT METAL & BOILER WORKS

the OIL AND GAS JOURNAL

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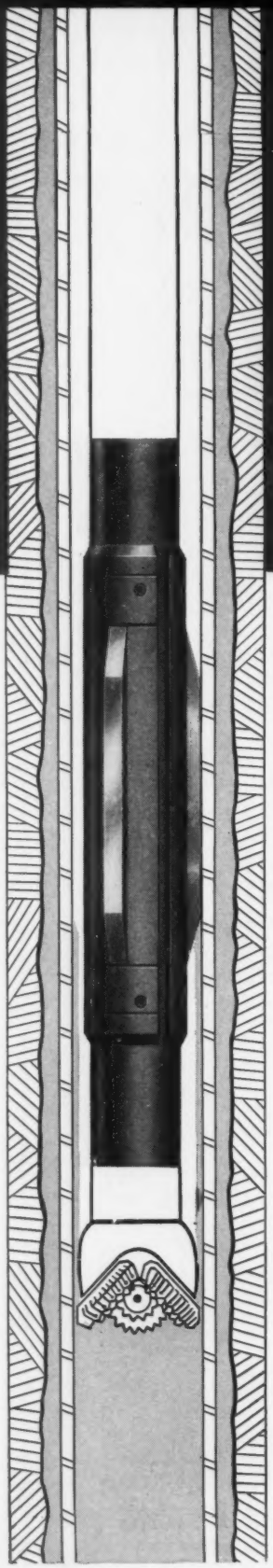


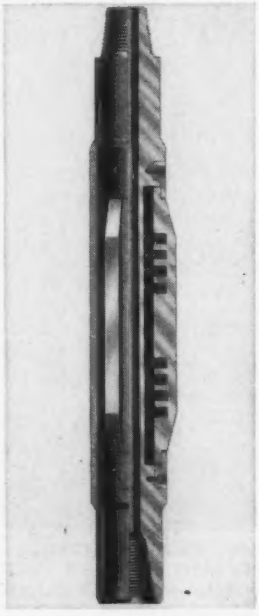
How is the "Working Surface" of your Casing?

UNLESS the inside of your casing—the working surface—is smooth and clean, there is always a hazard of encountering difficulties in future down-hole operations. The use of a Baker Casing Scraper eliminates this hazard, for it effectively removes all obstructions from the inside of the casing, leaving it smooth and clean to its full I.D.

The time to do a scraping job on your casing is while the equipment still is up and the crew still on hand. It's then a simple matter to include a Baker Casing Scraper in the string as a "follow-up" behind the bit when running-in to drill out cement. Thus, in one operation, it is possible to remove the hardened cement, scale, sharp burrs from gun-shot holes, or other obstructions which might later damage packers, swabs and similar tools.

Why you should be using the BAKER ROTARY CASING SCRAPER

(Product No. 620)



EASILY USED BY YOUR CREWS—Simply include Casing Scraper in the string when the bit is run to drill out cement.

MAKE SURE CASING IS CLEAN AND SMOOTH—While the equipment is still up, and the crew on hand, scrape casing to leave it in perfect condition for future operations.

MAKES FUTURE WORK SAFE AND EASY—Leaves casing its full I.D., free from hardened cement or other obstructions which damage packers, swabs, bailers, or other tools.

REMOVES SHARP BURRS FROM GUN-SHOT HOLES—The Baker Casing Scraper is strong enough to cut away all such obstructions which interfere with subsequent operations.

MAY COST A LOT *NOT* TO RUN IT—Damage to packers or swabs, plus delays and re-running expense can easily cost a lot more than the reasonable rental.

LOW-COST RENTAL—Serviceman is not required, and the rental price is reasonable.

It is not necessary to worry about maintaining exact hydraulic pressure to expand the blades of a Baker Casing Scraper. Simply use all the springs behind all blades when you want to remove burrs from gun-shot holes, and similar "hard" scraping; use only part of the springs when you have paraffin and similar soft substances to scrape away. Blade pressure is then automatically controlled—all you need to do is "turn to the right."

BAKER
OIL TOOLS

THE OIL AND GAS JOURNAL

What Will the Traffic Bear?

WITH the return of peacetime operations the railroads are again faced with the problem of what they should do to expand or at least maintain their prewar revenue in the shipment of crude oil and products. The rail carriers during the war years realized the potentialities of this petroleum business when returns from shipments were approximately double the average yearly oil revenue of the late thirties.

The war record of the railroads was outstanding in many respects but none was more important than the expanded petroleum movement throughout the entire country in contributing to a coordinated production program which would have fallen short of its many goals had it not been for the herculean efforts of the railroads and the tank-car owners. Everyone familiar with what the railroads did realizes the necessity of continuing a strong rail transportation system in this country.

But the time has arrived in the shipment of petroleum products when the railroads must either meet the competition of pipe lines and motor and water transportation or permanently lose an important segment of their gross revenue. It is futile now to discuss what might have been done had the rail owners pursued a different policy starting back 50 years ago when it became apparent that the shipment of crude oil and products was to become a major phase of national transportation. The owners for years have been too inclined to project revenues on high rates rather than volume and in the case of petroleum this policy has brought competition which is now well established.

Currently there is the situation that has been explained at ICC hearings by a group of Mid-Continent refiners opposing the proposal to increase rail rates 25 per cent. This would result in a further increase of about two-fifths cent per gallon on products shipped by rail from Mid-Continent refineries to Middle West consuming points.

There is the usual contention on the part of the carriers that the higher rates would add little to the consumer price of gasoline and other products. They are overlooking the main point in their proposal. Adding to the cost of a product delivered by rail simply increases the margin in favor of other transportation methods and assures their future expansion. The over-all net profits of the oil industry fall within a fraction of a cent per gallon on products and differences in transportation costs in recent years have been of major importance in the comparative position of individual operators.

So the question here is "What will the traffic bear?" in oil rail rates as determined by competition, and the answer is that the traffic has already borne more than it should. The solution lies in giving thought and action to what can be done toward lower not higher charges.

Wide Variety of Terms, Conditions Found in 16 Big-Inch Bids

by Henry D. Ralph

WASHINGTON.—Sixteen proposals to purchase, lease, or use the Government's two big-inch pipe lines, or parts of them, were submitted to War Assets Administration and read at an all-day public opening last week.

The offers ranged from rental with no fixed guarantee to the Government up to a 40-year lease returning the Government $260,000,000, and purchase offers ranging up to $135,000,000, some for all cash and some with part of the payments based on earnings.

The two War Emergency Pipe lines cost the Government $145,500,000 to construct, but more than this sum was recovered as net income from wartime operations. The 24-in. big-inch crude line runs from Longview, Tex., to New York and Philadelphia, and the 20-in. little big-inch products line runs from the Beaumont, Tex., refinery area to New York and Philadelphia. Both lines were shut down last fall and are being maintained in stand-by condition.

The offers which sounded best as they were read were from bidders who propose to convert the lines to natural gas. A number of bidders propose to attempt to use the lines as common carriers for crude oil and petroleum products, but most of these reserved the right to convert to natural gas if the oil operation proved uneconomical.

In its report to Congress January 4, Surplus Property Administration, predecessor to War Assets Administration, laid down a policy for disposal of the big-inch lines, stating that preference would be given to oil use over gas proposals. However, all of the gas proposals submitted included provisions for maintaining in stand-by condition the petroleum pumping, storage, and other handling facilities and provisions for the Government to recapture the line and reconvert it to oil transportation in time of national emergency, thus preserving its military value as an oil carrier.

WAA announced that the bids will be carefully analyzed by its staff and that the staff reports will be made public before they are acted on so that interested parties may submit comments. This process may take about a month. In case WAA decides to take one of the gas proposals it will submit a report to Congress which, under the terms of the surplus property act, could not become effective until Congress had had 30 days to disapprove it. All the gas offers were conditioned on obtaining a certificate of convenience and necessity from the Federal Power Commission to operate the lines as an interstate gas-transmission system.

Comments on the significance of the bids for the big-inch lines will be found under Watching Washington, page 64.

Most Offers Private

Comparison of the bids on the basis of monetary offers is difficult because of variations in the property covered, terms of settlement, and other conditions. Some offers excluded the oil-pumping equipment; others included it with offers to maintain it at the bidder's expense while others required maintenance at government expense. Some bidders asked government loans, though most of them offered private capital. Some offered all cash at once, some cash payments spread over a reasonably short period, while some asked that the Government accept the bidder's bonds, stock, or income debentures with long maturities. Some of the offers were combination purchase and lease proposals.

Quite a number of the bids came from individuals entirely unknown in the oil or gas industries, while others were from large operators with apparently adequate financial backing and knowledge of the industry.

The published disposal policy gives WAA leeway to consider almost any of the proposals. Financial return to the Government is only one of the considerations, others including considerations of welfare of small operators, preference for private over government operation, avoidance of monopoly, widespread ownership and control, operation as common carriers, and the public interest in general.

Synopsis of the Offers

The following is a synopsis of the bids in the alphabetical order in which they were read:

1. John Bauer, Ph.D., American Public Utilities Bureau, 280 Broadway, New York City. Offered to purchase both lines for $70,000,000 to be used for both oil and natural gas. Bid offered in the name of a preliminary organizing committee, the only other members named being Thurman Arnold, former assistant attorney general, and his present law partner, Abe Fortas, former undersecretary of the interior.

Bauer proposed to form a mutual oil and gas transmission company, a non-stock cooperative association composed of independent refiners and oil jobbers who would use the lines. The big-inch would be used for crude, the 20-in. for products, but if not used to capacity one would be converted to gas and perhaps a 30-in. gas line would be built on the right-of-way.

A government loan of the entire purchase price was asked, though private capital was promised to finance conversion and new construction. The proposed co-op's board of directors would include representatives of independent refiners and oil distributors, local gas companies, governments of cities served with gas and oil by the lines, labor and management engaged in the operation, and the federal Government. The War Assets Administration was asked to assist in supplying a technical staff.

The proposal included a dissertation on the value of the cooperative plan and the social benefits to be derived from this form of operation of the lines. It stated that charges would be based on actual costs, monopoly would be prevented, and it would constitute a yardstick for judging other pipe-line operations.

2. Big Inch Oil, Inc., 41 East Forty-second Street, New York, a Delaware corporation, submitted by Charles H. Smith, president. Offered to buy both lines for $110,000,000 for common-carrier oil use, saying an intensive survey demonstrated that this is economically justified.

Bidder proposed to spend an additional $20,000,000 immediately to build a 20-in. extension from Longview to West Texas, stating this is so important it reserved the right to take up part of the eastern end of the 20-in. line to obtain material. Also reserved the right to reverse the flow of parts of both lines and rearrange and relocate feeder and distribution lines.

The firm would not engage in producing, refining, or marketing oil but would serve as a true common carrier and promised reasonable tenders and storage charges and rates based on cost plus a reasonable profit.

The right to construct a 30-in. gas line on the right-of-way reserved, subject to Federal Power Commission approval. As payment the bidder offered to put $1,000,000 in escrow at once, pay $66,000,000 cash on execution of the contract, and deliver $44,000,000 in 30-year 4 per cent income debenture bonds.

3. Big Inch Natural Gas Transmission Co., by its president, Robert J. Bulkley, former senator from Ohio, now attorney in the Munsey Building, Washington. Offered $85,000,000, all cash, for purchase of such parts of both systems as are usable in natural gas transmission, excluding pumping stations, tank farms, and most of the feeder lines. The line would be so

(Continued on page 137)

Crude Price Advance Extended to Appalachian Area, California

PRICE increases for crude oil producers became general throughout the country last week when purchasing companies in California and the Appalachian area joined in higher postings.

A flat 25-cent increase was announced by most companies buying Pennsylvania-grade crude. In California, Standard Oil Co. of California, usual West Coast market leader, posted crude increases ranging between 10 and 30 cents.

The 25-cent advance in the Appalachian area followed the pattern of the increases which took place in the Mid-Continent area and Texas the previous week. Pennsylvania increases were announced by the Seep Purchasing Agency of South Penn Oil Co., and the action was quickly followed by other companies.

With the crude advance now nationwide, the interest of the industry centered on the question of the effect of the price increases on the subsidy paid by the federal Government for stripper well production. The situation is particularly applicable to Pennsylvania grade crude which carries a subsidy of 75 cents in contrast to payments ranging up to 35 cents elsewhere in the country.

Federal officials announced the full subsidy will be paid for July, but the exact amount to be paid subsequently is still under discussion in Washington. The law provides for ending the subsidy by next April.

South Penn Oil Co. new prices, effective August 1, were:

Allegany district in Bradford Transit Lines, $3.35; Bradford district in Bradford Transit Lines, $3.35; Bradford district in National Transit Lines, $3.35; Bradford district (Tiona) in National Transit Lines, $3.35; Pennsylvania Grade in South West Pa. Pipe Lines, $3.00; Pennsylvania Grade in Eureka Pipe Line, $2.94; Buckeye Pennsylvania Grade in Buckeye Pipe Line, $2.90; and Corning Grade in Buckeye Pipe Line, $1.66.

New postings by other companies in the Appalachian area included:

Tide Water Associated Oil Co., Bradford and Allegany crude, $3.35.

Kendall Refining Co., $3.35.

Sinclair Refining Co., Westville, N. Y., $3.35.

Quaker State Oil Refining Corp., for Pennsylvania grade in Buckeye Pipe Line, $2.90; Pennsylvania grade in Eureka Pipe Line, $2.94.

Pennzoil Co., for Pennsylvania grade in National Transit Lines—Group A, including Cochran, Franklin, Hamilton, and Doolittle Districts, $3.28; Group B, including Titusville District, $3.27; Group C, including Turkey and Tidioute Districts, $3.26; Group D, including Brea Creek and Porkey Districts, $3.25; and Group E, including Eidenau, Bull Creek, Rough Run, Carbon, Dipner, Bredin, McJunckin, Jameson, Kennerdell, Emlenton, Tiona, Lacy, and Kinzua Districts, $3.18.

The prices posted by the Pennsylvania grade purchasers are exclusive of the subsidy.

Standard of California's increases

STANDARD OIL CO. OF CALIFORNIA PER-BARREL PRICES PAID FOR CRUDE OIL EFFECTIVE AUGUST 1, 1946
(All gravities above those quoted take highest price offered in that field)

Gravity	Signal Hill (Long Beach)	Wilmington	El Segundo	Seal Beach	Huntington Beach	Inglewood	Olinda Brea Canon	Athens-Rosecrans	Torrance	Richfield	Whittier East Coyote	Montebello	West Coyote Hills	Santa Fe Springs	Newhall, Kern River, Kern Front*	Greeley, Canal Wasco	Coles Levee, Elk Hills Stevens Zone	Mountain View	Elk Hills (Shallow), Buena Vista Hills†	Lost Hills	Coalinga
12-12.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	$1.14	....	....	....	$1.14	$1.14	$1.14
13-13.9	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1.16	....	....	....	1.16	1.16	1.16
14-14.9	....	$1.13	....	....	$1.16	....	$1.15	....	$1.15	$1.15	$1.15	$1.17	....	....	1.18	....	....	....	1.18	1.18	1.18
15-15.9	....	1.16	....	....	1.20	$1.21	1.17	....	1.17	1.16	1.17	1.17	....	....	1.18	....	....	....	1.18	1.18	1.18
16-16.9	....	1.16	$1.21	....	1.20	1.21	1.17	....	1.17	1.16	1.17	1.17	....	....	1.18	....	....	....	1.18	1.18	1.18
17-17.9	....	1.19	1.21	....	1.20	1.21	1.17	....	1.17	1.16	1.17	1.17	....	....	1.18	....	....	....	1.18	1.18	1.18
18-18.9	$1.17	1.22	1.21	....	1.23	1.23	1.20	....	1.17	1.19	1.20	1.18	....	....	1.18	....	....	....	1.18	1.18	1.18
19-19.9	1.21	1.26	1.21	....	1.27	1.26	1.24	....	1.19	1.23	1.23	1.21	....	....	....	....	....	$1.18	1.18	1.19	1.18
20-20.9	1.24	1.29	1.21	....	1.31	1.29	1.27	....	1.22	1.27	1.26	1.24	....	....	....	....	....	1.18	1.22	1.22	1.19
21-21.9	1.28	1.32	1.22	....	1.34	1.31	1.31	....	1.26	1.30	1.29	1.26	....	....	....	....	....	1.18	1.26	1.25	1.21
22-22.9	1.32	1.36	1.26	$1.24	1.37	1.34	1.34	....	1.29	1.34	1.32	1.29	$1.32	....	....	....	....	1.20	1.30	1.28	1.24
23-23.9	1.35	1.39	1.30	1.29	1.40	1.37	1.37	....	1.33	1.37	1.35	1.32	1.35	....	....	....	....	1.24	1.34	1.30	1.26
24-24.9	1.39	1.42	1.33	1.34	1.42	1.39	1.41	....	1.36	1.41	1.38	1.35	1.37	....	....	....	....	1.28	1.38	1.33	1.29
25-25.9	1.43	1.46	1.37	1.38	1.45	1.42	1.44	....	1.39	1.44	1.41	1.38	1.40	....	....	....	....	1.32	1.42	1.36	1.31
26-26.9	1.46	1.49	1.41	1.43	1.47	1.44	1.48	....	1.43	1.48	1.44	1.41	1.43	....	....	....	....	1.36	1.46	1.39	1.34
27-27.9	1.50	1.52	1.44	1.48	1.49	1.47	1.51	$1.43	1.46	....	1.47	1.45	1.46	$1.44	....	....	....	1.40	1.50	1.42	1.36
28-28.9	1.54	1.56	1.48	1.52	1.51	1.50	1.54	1.47	1.49	....	....	1.48	1.49	1.48	....	....	....	1.44	1.54	1.44	1.38
29-29.9	1.57	1.59	....	1.57	1.53	1.52	....	1.51	....	....	....	1.52	1.51	1.52	....	....	....	1.49	1.59	1.47	1.41
30-30.9	1.61	1.62	....	1.61	1.55	1.55	....	1.55	....	....	....	1.55	1.54	1.55	....	$1.35	$1.40	1.53	1.63	1.50	1.43
31-31.9	....	....	....	1.66	....	1.58	....	1.59	....	....	....	1.59	1.57	1.59	....	1.39	1.44	....	....	....	1.46
32-32.9	....	....	....	1.69	....	....	....	1.63	....	....	....	1.63	1.60	1.63	....	1.43	1.47	....	....	....	1.48
33-33.9	....	....	....	....	....	....	....	1.67	....	....	....	1.67	1.62	1.66	....	1.47	1.51	....	....	....	1.51
34-34.9	....	....	....	....	....	....	....	1.71	....	....	....	1.71	1.65	1.70	....	1.51	1.54	....	....	....	1.53
35-35.9	....	....	....	....	....	....	....	....	....	....	....	1.75	1.68	....	....	1.55	1.57	....	....	....	....
36-36.9	....	....	....	....	....	....	....	....	....	....	....	1.78	....	....	....	1.59	1.61	....	....	....	....
37-37.9	....	....	....	....	....	....	....	....	....	....	....	1.81	....	....	....	1.62	....	....	....	....	....
38-38.9	....	....	....	....	....	....	....	....	....	....	....	1.83	....	....	....	1.65	....	....	....	....	....
39-39.9	....	....	....	....	....	....	....	....	....	....	....	1.86	....	....	....	....	....	....	....	....	....
40-40.9	....	....	....	....	....	....	....	....	....	....	....	1.89	....	....	....	....	....	....	....	....	....

Other crude oil price increases for Standard of California were: Wheeler Ridge—$1.17 for 22-22.9 gravity with a 4-cent differential per degree up to $1.25 for 24-24.9; Kettleman Hills—$1.61 for 35-35.9 gravity with a 4-cent differential per degree up to $1.69 for 37-37.9; Gato Ridge—94 cents for 12-12.9 gravity with a 2-cent differential per degree up to $1.00 for 15-15.9 gravity; and Elwood Terrace, $1.60 for 33-33.9 gravity with a 4-cent differential per degree up to $1.68 for 35-35.9 gravity.

*McKittrick, Round Mountain. †Midway-Sunset, Lakeview Area

were effective at 7 a. m., August 1. Other purchasers in the state, following traditional prewar practices, promptly met the advance, stabilizing all producing operations at a higher level. California Standard's increases are detailed in the table on this page.

In the Texas and Mid-Continent area, various other companies were swinging into the movement for higher prices with new postings. A major announcement was that made by Shell Oil Co., for West Texas, New Mexico and Louisiana Gulf Coast.

Shell Oil Co., Inc., 25 cents per barrel increase over previous posted prices in West Texas and New Mexico; 19 cents increase in per-barrel prices in Black Bayou (light) Chalkley, Gibson, Goodhope, Happtown, Iowa (light), Lapice, Roanoke, South Houma, St. Gabriel (K-sand type) Weeks Island, West Lake Verret and White Castle (high-cold test), Louisiana Gulf Coast—prices for this area begin at $1.28 per barrel for below 20° gravity and increase by differentials of 2 cents per degree gravity up $1.70 for 40 gravity and above; 37 cents per barrel increase in heavy, low cold test and F-sand type crudes in the Louisiana Gulf Coast area. Below 20°-gravity crudes in this group are priced at $1.41 per barrel and for above 40° at $1.83. Yates Deep and Taylor Link pool prices are posted at $1.30 flat. A flat price of $1.60 is posted for East Texas, Livingston, and Mercy.

California Crude Advance Justified by High Demand, Rising Costs

by H. Stanley Norman

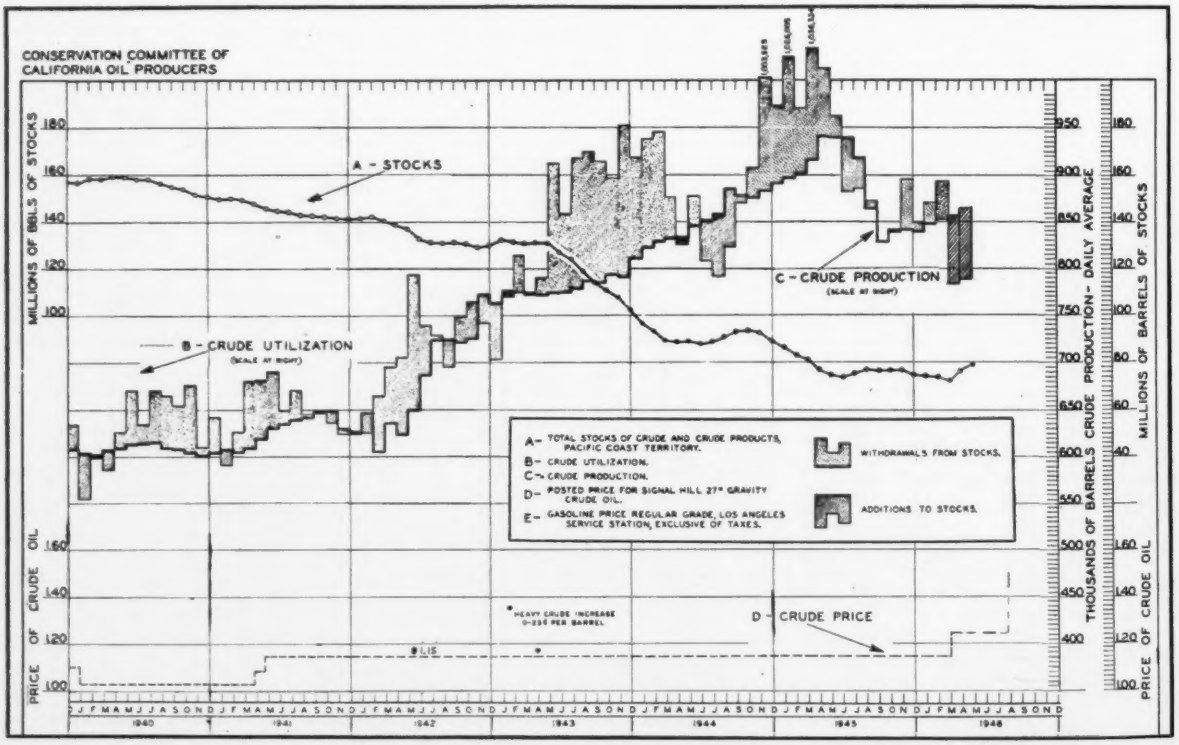
LOS ANGELES.—Increasing domestic demand for West Coast petroleum products has not wholly compensated for precipitous declines in federal requirements since end of the war. But as in other parts of the country, peacetime consumption of petroleum exceeds previous estimates on the Pacific Coast. The continuing high demand has extended excessive rates of withdrawals from certain pools with accompanying rising costs.

Consequently, the physical factors in the Pacific Coast petroleum industry, economists and engineers assert, fully support the advance of 10 to 30 cents per barrel in posted prices for crude oil which was inaugurated by Standard Oil Co. of California.

In California, federal demand for motor fuel and aviation gasoline has shown a steep decline with current domestic demand alone exceeding prewar total requirements by approximately 50,000 bbl. per day. Federal demand dropped from a mid-1945 peak of nearly 230,000 bbl. of gasoline per day to what may be considered a normal level of 40,000 to 50,000 bbl. per day. Domestic demand, including federal requirements for the past few months, is more than 300,000 bbl. daily, allowing for normal increment since the last specific data through May. Prewar domestic demand reached a peak of around 230,000 bbl. daily in the summer of 1941.

The rapidity with which peacetime demand for motor fuel and other petroleum products followed V-J Day prevented the California industry from rebuilding inventories to more comfortable working levels. Stocks of all oils totaled 73,006,000 bbl. at the start of this year compared with approximately 140,000,000 bbl. at the end of 1941, starting the war period. Restoration of inventories, it is pointed out by observers, will be an exceedingly slow process in the absence of substantial new discoveries. There is general agreement among operators that the higher postings for crude oil will stimulate exploration but, until reaction of the industry is more apparent, there is division of opinion on the trends in wildcat drilling.

(Continued on page 139)


CONSERVATION COMMITTEE OF CALIFORNIA OIL PRODUCERS
MILLIONS OF BBLS OF STOCKS
A - STOCKS
B - CRUDE UTILIZATION
(SCALE AT RIGHT)
C - CRUDE PRODUCTION
(SCALE AT RIGHT)
D - CRUDE PRICE
PRICE OF CRUDE OIL
THOUSANDS OF BARRELS CRUDE PRODUCTION - DAILY AVERAGE
MILLIONS OF BARRELS OF STOCKS
A - TOTAL STOCKS OF CRUDE AND CRUDE PRODUCTS, PACIFIC COAST TERRITORY.
B - CRUDE UTILIZATION.
C - CRUDE PRODUCTION.
D - POSTED PRICE FOR SIGNAL HILL 27° GRAVITY CRUDE OIL.
E - GASOLINE PRICE REGULAR GRADE, LOS ANGELES SERVICE STATION, EXCLUSIVE OF TAXES.
WITHDRAWALS FROM STOCKS.
ADDITIONS TO STOCKS.
* HEAVY CRUDE INCREASE 0-25¢ PER BARREL
1940
1941
1942
1943
1944
1945
1946

This chart reflects the trends of the last 6½ years in the oil industry in California. It was adapted from the annual report for 1945 of the Conservation Committee of California Oil Producers and shows the crude price advances of last week

THIS 1946 S M T W T F S WEEK

PRODUCTION—Railroad Commission increases shutdown days for West Texas to nine because of increasing storage and lack of transportation facilities. . . . Action lowers allowable estimated 30,000 bbl. daily. . . . ¶Railroad Commission's first hearings on new MER rates brings recommendations for slightly lower maximums, though no drastic cuts are asked by operators. . . . ¶Crude stocks increase 1,016,000 bbl. to total of 223,756,000 as of July 27. . . . ¶U. S. production for week ended August 3 totals 4,892,000 bbl. daily, down 36,450 bbl. daily from previous week. . . . Texas output drops from 2,227,550 bbl. daily to 2,196,250 bbl. daily. . . . ¶Civilian Production Administration appeals to oil industry for aid in meeting iron and steel scrap shortage. . . . Asks every effort to gather and move scrap to mills. . . . ¶Mounting demand making shortage of steel drums more acute, though production schedules being met. . . .

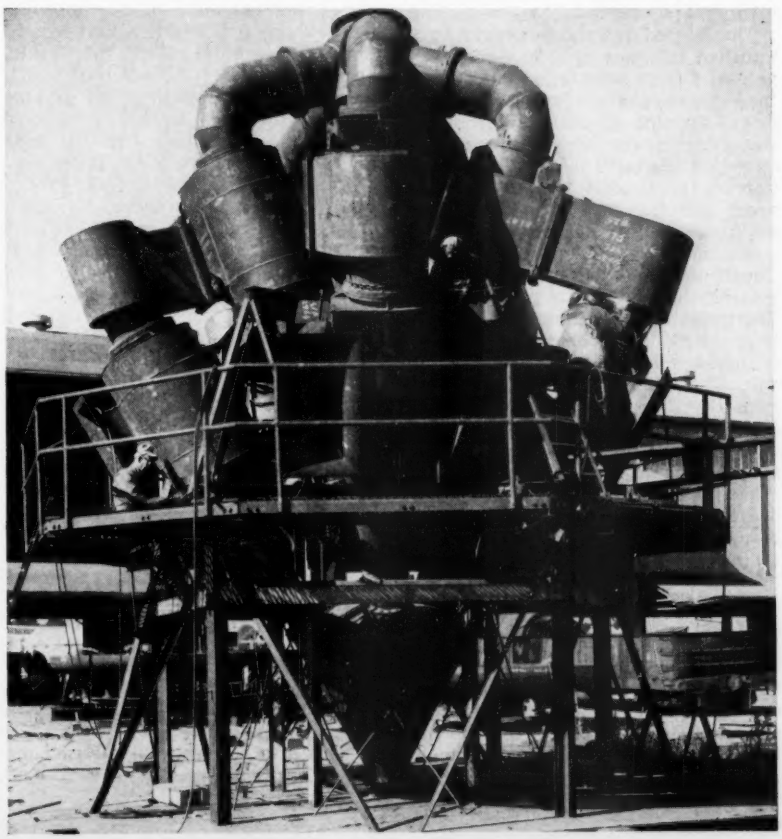
PRICES—California, Pennsylvania-grade areas join movement for higher crude prices. . . . Flat 25-cent raise made by most purchasers in Appalachian area. . . . Increases announced by California Standard range between 10 and 30 cents. . . . ¶Oil industry waits an official statement from Washington as to policy on stripper subsidy payments after August 1. . . . Full subsidy to be paid for July production but the course to be followed thereafter is in question. . . . ¶Products prices in California climb 1 cent behind the crude advance. . . . Increase covers most light products with industrial fuel oils unchanged. . . . ¶Mid-Continent motor fuel market still at 6 3/4-7 cents, but another rise generally expected. . . . ¶Jersey Standard announces products increases. . . . Advances gasoline an average of 3/4 cent, residual 20 cents per barrel. . . .

RESEARCH—Phillips Petroleum buys tracts west of Bartlesville, Okla., for use in extension of centralization of its research work. . . . ¶Pure Oil discloses plans in development stage to build a new research and development laboratory in Crystal Lake, Ill., where company has agreed to purchase a 68-acre plot. . . .

LEGISLATION—As expected, President Truman vetoes tideland quitclaim resolution which would have given states clear right to offshore land to international limit. . . . President says question should be decided by courts, not Congress. . . . House fails by 17 votes to override veto. . . .

TRANSPORTATION—Industry circles express surprise over number and character of bids offered for War Emergency Pipe Lines. . . . Of 16 offers, best appear to come from interests planning to use lines for gas. . . . Gas movement certain to meet heavy opposition from coal-state congressmen. . . . WAA announces offers will be analyzed and reports made public so that interested parties can make comments. . . . ¶Cosden Petroleum reveals Texas & Pacific Railroad officials are studying possibility of seeking rates which would be competitive with costs of Cosden's proposed pipe line from its Big Spring refinery. . . . ¶Maritime Commission in Washington sells five T-3 tankers. . . . Buyers include Cities Service, Gulf, Richfield, and Sinclair Refining. . . .

REFINING—Bureau of Mines survey shows octane ratings last winter highest ever marketed. . . . Following the war and before the lead shortage cut into ratings, average regular octane was 75.9, premium, 80.9. . . . Wisconsin Oil Refining at Sheboygan discloses plans to up capacity to 8,000 bbl. daily and make other improvements. . . .



The oil industry's efforts to produce more and better motor fuel have resulted in the construction of useful though strange-looking equipment. This cyclone separator at the Houston refinery of Shell Oil Co., Inc., resembles a giant airplane turbine or—to the outsider—something out of Buck Rogers. The separator removes and recovers catalysts from outgoing cracked vapors out of the reactor of a new catalytic cracking unit at the refinery. Made of carbon steel, it stands 27 ft. high, 23 ft. wide, and weighs 29 tons. The view here shows workmen assembling the separator in the refinery shops

Truman Cites Supreme Court Case In Vetoing Tideland Resolution

WASHINGTON.—President Truman vetoed the tidelands quitclaim resolution, and the House upheld the veto on the last day of its session, thus putting to the Supreme Court the question of whether the states or the federal Government owns the submerged lands off the coasts of California and the Gulf.

The House vote to override the veto was 139 to 95, which was 17 votes short of the necessary two-thirds. Last fall the House had passed the resolution by an overwhelming vote, but few members were on the floor during the closing hours of the session.

At its October term the Supreme Court is scheduled to take up the pending suit filed by the Department of Justice against the State of California claiming title to all subocean lands along the Pacific Coast between the low-tide mark and the 3-mile international limit. The object is to gain federal control of the oil fields off the Los Angeles area, now being operated under state leases. Should the Government win this suit, the present oil operators would be trespassers and could either be ejected or required to pay royalties and perhaps damages to the federal Government.

The vetoed resolution would have nullified this suit by disclaiming any federal title to submerged lands other than those parcels specifically acquired by gift or purchase from the states or private owners. It was premised on the fact that from the adoption of the Constitution until a few years ago the title of the states to all submerged lands had never been questioned. More than 50 Supreme Court decisions were cited as supporting this view, though no one of them specifically affirmed state title to the bed of the open ocean which is involved in the pending California suit. The attorneys-general of more than 40 states supported the quitclaim resolution on the ground that if the federal Government should establish title to any submerged lands it would be a precedent for claiming ownership of the beds of rivers, harbors, bays, lakes, and marshes, and all piers, harbor works, filled lands, oyster beds, and everything on them.

In his veto message President Truman said that title to submerged lands is a legal question and should be decided by the courts rather than by Congress, and "the ownership of the vast quantity of oil in such areas presents a vital problem for the nation from the standpoint of national defense and conservation."

In his veto message the President said:

"The phrase lands beneath tidewater is defined so broadly as to include all lands, either submerged or reclaimed, situated under the ocean beyond the low water mark and extending out to a line 3 geographical miles distant from the coastline or to the boundary line of any state whose boundary, at the time of the admission of the state to the Union, extended oceanward beyond 3 geographical miles. . . .

A Widespread Misunderstanding

"The Supreme Court's decision in the pending case will determine rights in lands lying beyond ordinary low water mark along the coast extending seaward for a distance of 3 miles. Contrary to widespread misunderstanding, the case does not involve any tidelands, which are lands covered and uncovered by the daily ebb and flow of the tides; nor does it involve any lands under bays, harbors, ports, lakes, rivers or other inland waters. Consequently the case does not constitute any threat to or cloud upon the titles of the several states to such lands, or the improvements thereon. When the joint resolution was being debated in the Senate, an amendment was offered which would have resulted in giving an outright acquittance to the respective states of all tidelands and all lands under bays, harbors, ports, lakes, rivers and other inland waters. Proponents of present measure, however, defeated this amendment. This clearly emphasized that the primary purpose of the legislation was to give to the states and their lessees any right, title or interest of the United States in the lands and minerals under the waters within the 3-mile limit.

"The ownership of the land and resources underlying this 3-mile belt has been a subject of genuine controversy for a number of years. It should be resolved appropriately and promptly. The ownership of the vast quantity of oil in such areas presents a vital problem for the nation from the standpoint of national defense and conservation. If the United States owns these areas, they should not be given away. If the Supreme Court decides that the United States has no title to or interest in the lands, a quitclaim from Congress is unnecessary.

"The attorney general advises me that the issue now before the Supreme Court has not been heretofore determined. It thus presents a legal question of great importance to the nation, and one which should be decided by the Court. The Congress is not an appropriate forum to determine the legal issue now before the Court. The jurisdiction of the Supreme Court should not be interfered with while it is arriving at its decision in the pending case.

"For the foregoing reasons I am constrained to withhold my approval of the joint resolution."

Oil Industry Cooperating To Meet Scrap Shortage

WASHINGTON.—The oil industry this week prepared to cooperate in a national iron and steel-scrap collection campaign undertaken to meet a critical scrap shortage at the mills.

J. D. Small, Civilian Production Administration head, appealed to the industry to make every effort to collect and move scrap to steel mills.

"Inventories of scrap have reached dangerously low levels," he said. "Open-hearth furnaces are being taken off for lack of scrap. This is at a time when we can ill afford any further interruption of steel production.

"We are asking the industry, through its executives, to immediately institute a survey of all properties for sources of scrap and to arrange to collect and move the material immediately. The petroleum industry has always been a dependable source of scrap, and its personnel has responded to every request we have made of them."

Ray E. Miller to Head Sales Division of du Pont

Ray E. Miller has resigned as vice president in charge of Gulf Coast sales of the Warren Petroleum Corp. effective September 1 according to an announcement by J. A. La Fortune, executive vice president of the Warren company. Miller has accepted a position as sales director, chemicals division of the organic chemical department of E. I. Du Pont de Nemours Co. with headquarters in Wilmington, Del. He will organize a new section to handle the sales and distribution of petroleum additives.

Miller is widely known in the petroleum industry having served for several years as vice president and sales manager of Hanlon-Buchanan, Inc., until the recent sale of the company to the Warren corporation. He also served as secretary of the Natural Gasoline Association of America before joining the Hanlon-Buchanan organization.

Products Up 1 Cent in California; Mid-Continent Prices Steady

by Dahl M. Duff

MOTOR fuel and other light products followed crude to new higher price levels in California last week while quotations in the Mid-Continent area and Texas were generally unchanged.

Along with its 10 to 30-cent crude increases, Standard Oil Co. of California advanced gasoline, kerosene, light fuel oils and most other products, excepting residual, 1 cent a gallon with slightly greater advances at some inland points to compensate for higher freight rates recently authorized by the Interstate Commerce Commission.

Nearly all motor fuel was moving under contract in the Mid-Continent area. Published quotations stood at 6¾-7 cents, with further rises anticipated before the end of the peak gasoline consuming season. Natural gasoline again rose ¼ cent to 4 cents in Oklahoma and 3½ in North Texas for the 26-70 grade.

Most refiners were quoting 7¾ cents for premium motor fuel in an effort to reestablish the 1-cent differential which was reduced to ¾ cent during the war. Filling stations were passing the tank-wagon and tank-car boosts on to the consumer. One major station in Tulsa was reported to have raised regular from 20 to 22 cents, and Ethyl from 22 to 23 cents.

In the East, Standard Oil Co. of New Jersey joined other companies in revising products prices upward. The gasoline increase varied from 0.4 cent to 1 cent a gallon through the company's marketing territory, with the average advance being about ¾ cent. Adjustments ranging up to 0.6 cent a gallon were made in the price of kerosene and heating oil.

Interest of eastern marketers continued to center on residual. Jersey Standard advanced residual prices 20 cents a barrel, though other companies had raised 25-30 cents a barrel. Jersey Standard's action was reportedly taken on grounds the 20-cent advance was one that was completely justified on the basis of higher refinery costs.

Residual was still tight in the New York area, and market observers watched for indications that users will convert to coal. One large utility which buys between 4,000,000 and 6,000,000 bbl. yearly decided against converting, but some market sources expressed belief other users will find coal more economical.

In New York Harbor, three residual suppliers were quoting $2.02 per barrel for residual, tank-car, three were quoting $1.92, and one, $1.97. The split in prices was also noted at the retail level where prices ranged from 5.46 cents to 5.70 cents per gallon for tank-wagon deliveries.

In California, industrial fuel oils, including most grades of diesel fuel, were unchanged at previously existing levels, despite the advance in other products. Cargo export markets were involved in the general advance of light products.

Some smaller refineries, marketing exclusively through jobber accounts, met only part of the gasoline advance, and it was regarded as likely that the scattered practice of offering premium of various types of patronage, would continue and possibly expand. A few stations in the Los Angeles area, for example, are giving ¼ lb. of butter with each 10 gal. gasoline purchase.

Water Flooding Project Authorized in Texas

AUSTIN, Tex. — Permission for Reno Oil Co. to conduct water flooding on its leases in Archer County, Texas, has been given by the Texas Railroad Commission.

Since wells in this area have reached a point where secondary recovery operations are considered feasible, the commission authorized the use of approximately 25 injection wells operating at the rate of 50 bbl. of water per input well daily. The flooding is to take place at a depth of 1,350 ft.

Producing Properties Sold In Five Transactions

Five oil transactions involving producing properties and considerations reportedly totaling more than $13,000,000 took place in Texas and Kansas last week. Foremost was the purchase by Pan American Production Co. of 60 wells in East Texas from H. R. Smith, Inc., for a reported $7,000,000.

In Houston, Raymond I. Arsht purchased 24 producing wells located in Starr County, Texas, from Lockhart & Co., for $2,600,000. The Starr Oil Co. has been organized to operate these properties, Arsht announced.

Two-thirds interest in 1,000 acres and 94 oil wells in Rusk County, Texas, were sold by H. H. Wegener, Oklahoma City oil man, to Tide Water Associated Oil Co. for $2,000,000. Another transaction at Tyler, Tex., involving $600,000 was General American Oil Co.'s purchase of 16 wells in East Texas oil field from Peachtree Oil Co.

Twenty oil wells, one gas well, and 10,000 acres of leases in Finney and Scott counties, Kansas, changed hands at Garden City, Kans., when Shallow Water Refining Co. purchased these producing properties from Atlantic Refining Co. Consideration was reported to be about $500,000.

DEATHS

Paul S. Ache, 65, former president of Reiter-Foster Oil Corp., died July 31 at his home in Tulsa. In recent years he had been an independent operator.

O. E. Dougherty, 65, division superintendent of production for Sinclair Prairie Oil Co., died August 4 in Tulsa. He had been with the company for 30 years, and prior to coming to Tulsa was active in Wyoming and Texas fields.

S. J. Higelmire, partner of Freeman Oil Co. and an independent producer, died recently at his home in Kalkaska, Mich.

Adolph R. Ehrhardt, 64, superintendent of maintenance for Magnolia Pipe Line Co., died August 2 in Dallas. He had been with the company since 1914, and was credited with the installation of most of the company's mechanical equipment.

Guy Linton, 41, secretary and treasurer of Wilshire Oil Co., Inc., Los Angeles, died July 30. He had been an officer of the Wilshire company since 1936.

J. W. Mooney, pipe-line department foreman of the Sinclair Refining Co., died July 28 in Ranger, Tex.

John N. Day, 70, retired independent oil and gas operator, died August 2 at his home in Tulsa.

Thomas W. Wilson, 77, vice president of the Wilson Supply Co., died recently in Houston.

George S. Watson, 58, retired executive of J. K. McEvoy & Co., died July 31 in Dallas.

Vollie Alton Pope, 54, inventory clerk in the material and traffic department of Carter Oil Co., died August 2 as the result of injuries sustained in an automobile accident near Enid, Okla.

John C. Grosser, superintendent of the Rouseville, Pa., refinery of Pennzoil Co., died July 23 in Philadelphia.

International

WORLD-WIDE OIL DEVELOPMENTS

New Oil Law Deferred, But Bolivia Continues Development Plans

by Warren W. Burns

NEW YORK.—While Bolivia's projected oil law—designed to permit the reentry of foreign producing capital into that country—will not be passed this fall, due to the political upheaval there and the ouster of Congress—plans continue for the organization of mixed companies.

The Oil and Gas Journal was told here early this week that at least 8 or 9 months will elapse before the proposed oil law again will be presented to a new Congress. However, there seems to be little doubt but that the revolutionary Government will be as interested in the development of Bolivia's natural resources as was the administration which came to a sudden end last month. Moreover, no political interference is anticipated with Yacimientos Petroliferos Fiscales Bolivianos (Bolivian Government Oil Fields), and as an indication of this, YPFB officials and 4 representatives of a United States company interested in Bolivian production, conferred here a few days ago.

Jorge T. Lavadenz, Arturo J. Machicao, and Miguel A. Roca, YPFB's president, New York representative, and engineer, respectively, met with the following oil men: Gordon Duke, president of Southeastern Oil Co. and affiliates; John Blow, Duke's partner; and Siguard Scholls and Lincoln Valentine, Southeastern's Latin American specialists. Duke and Blow are affiliated with other interests concerned with the future of Bolivia's oil-producing properties, as well as being interested in exploration and exploitation rights in Columbia and Mexico, and disposal of royalty oil in Venezuela and Colombia.

As there has been much speculation over the destination of newly discovered oil in Bolivia, Lavadenz explained that the export markets in Argentina, Brazil, and Paraguay are of such magnitude that the disposal of crude will never be any problem to the holder of a concession.

Argentine Market Considered

Moreover, Lavadenz explained that if oil was developed in the Chapare area—near the Government's reserve around Cochabamba—and if it was in more than sufficient quantities to supply the projected refinery at Cochabamba, that the Camiri-Cochabamba pipe line, now being built, might be reversed, with the excess crude going to Camiri and from there to Argentina. YPFB reportedly would prefer to process crude from nearby Chapare than pump it through the 340-mile Camiri-Cochabamba line.

YPFB is obligated to supply Argentina, over a 20-year period, with $40,000,000 worth of oil, in return for obligations already incurred for railroad and other construction work.

Under current plans for mixed company operation in Bolivia, 80 per cent of the capital would be furnished by private interests, with 20 per cent being put up by the Bolivian Government. However, as the law now stands, the Government would legally hold 25 per cent of the stock; but if the company were ever liquidated, 80 per cent of the assets would be returned to the private investors. About this there seems to be no disagreement. However, YPFB has been approached to alter certain of the law's drilling obligations.

Regarding YPFB participation in the mixed companies, Lavadenz said that his organization would be glad to carry through such work as road building and other types of projects to which its facilities were well adapted.

The most favorable areas for mixed company drilling are reported to be along the eastern slope of the sub Andean belt where definite seepages occur, and in the valley flats along the eastern border near Brazil. The valley area—south of the property to be developed by Bolivian - Brazilian Mixed Commission — is highly inaccessible. However, a railroad into this area is now under construction.

Asked about the export price for oil shipped to Argentina and Brazil, Lavadenz explained that every 6 months an average price, based on posted Gulf Coast export prices, is fixed and payments made accordingly. At the end of each 6-month period, adjustments are made on the basis of daily quotations for reference oils.

While YPFB has authority—or did under Bolivia's former Government—to carry on negotiations with outside private interests, concerning the development of Bolivian oil properties, Lavadenz explained that Congress was asked to pass the projected oil law so as to clarify this authority and to indicate whatever negotiations resulted were carried out with specific Congressional permission. This specific permission—which presumably would have been approved this fall—will again be sought from the new Congress. And until then, it is practically certain that no U. S. oil capital will enter Bolivia.

Grozni Production to Go To Interior of Russia

MOSCOW.—According to Moscow radio reports, the entire oil production of the Grozni district will be moved from the Caspian port of Makhach Kala and from there to the interior of Russia. Makhach Kala, situated about 90 miles west of Grozni, presumably will be one of the Soviet's largest oil deposits.

In 1938, Grozni's estimated production for the year totaled 22,000,000 bbl., but production since then is said to have declined. The areas of Russia formerly supplied by Grozni may obtain some of their demands from Romania, or possibly from some newly developed Russian oil field.

Shell Planning to Build New Refinery In British North Borneo

NEW YORK.—Construction of a new refinery on the Island of Maura, in British North Borneo's Brunei Bay, by Royal Dutch Shell interests, is being planned, according to well-informed oil sources.

Meanwhile, restoration of Shell's 20,000-bbl. daily skimming plant at Lutong, in adjoining Sarawak, is progressing according to Shell's 1945 yearly report. N. V. de Bataafsche Petroleum Maatschappij is the operating company in the Netherlands East Indies for the Shell group.

In British Borneo, Shell recovered possession of the Seria oil fields in Brunei and the Miri oil field in Sarawak. Both fields had been captured by the Japanese, and when they retreated, fire was set to the wells in Seria and all major installations blown up. By the end of last year, the fires were brought under control and rehabilitation commenced. Moreover, early this year Shell started drilling there again.

As the Lutong refinery in Sarawak is still under construction, crude shipments from this area—which commenced with a cargo to Australia last March—will continue, according to the board of directors' report. Current daily production in British Borneo is 1,400 metric tons (10,360 bbl.), with a substantial increase seen by the end of this year.

Unlike Miri, where tankers are loaded 2 miles offshore, by means of a pipe line, the island of Maura has deep water anchorage, a factor which is expected to facilitate operations when the new refinery there is completed. Exploration is expected to be resumed shortly both at Sarawak, west of Miri, and in Borneo, east of Brunei Bay, where the possibility of oil deposits are believed to be good.

Concerning the over-all situation in the Netherlands East Indies, the Shell directors said:

"Although the Netherlands Indies was liberated from the Japanese enemy on August 15, 1945, political difficulties, which arose thereafter, and which may be regarded as generally known, prevented a proper resumption of work in this beautiful country. Consequently, we cannot yet form a sufficiently clear picture of the state in which the various properties of the group are to be found, nor have we absolutely reliable data concerning the oil fields, pipe lines, refineries, and other installations.

"One encouraging feature is that we were able to set to work again in Tarakan and Balikpapan and that as regards Tarakan—which was liberated on May 2, 1945—we resumed production on a modest scale on June 27, while the first delivery took place in October 1945. Production has gradually increased since then.

"Balikpapan was freed on June 1, 1945, and production was resumed in January 1946. It proved possible to repair some of the distillation units and there is every appearance that the processing of crude oil and the delivery of products can be resumed on a limited scale in August, 1946.

"We are taking preparatory measures for the resumption of the work of exploration in the Vogelkop district of New Guinea. Here again a preliminary examination has shown that the damage done to the property of the Netherlands New Guinea Petroleum Co. is considerable.

Political Settlement Awaited

From Palembang, on N.E.I.'s Sumatra, reports indicate that a steadily increasing number of British, Dutch, and American technicians are in Batavia, on the adjoining island of Java, awaiting the moment when political conditions permit them to resume work in their companies' oil fields and at the refineries. The military situation in Sumatra, however, is not expected to abate in the immediate future. Moreover, the evacuation of Japanese troops from Sumatra is creating somewhat of a problem, and according to reports the British are opposed to withdrawing the Japanese troops from the Palembang refineries until some adequate substitute protection is provided.

The Palembang reports said the refineries on the outskirts of the city are inactive while condition of the Sumatran oil fields is varied.

Japanese troops are guarding Shell's field in the Djambi area where a considerable stock of products are on hand. The area suffered little extensive damage during the war.

The Palembang reports said the Pladjoe refineries, though not in good condition, could be placed back in operation in a short time. About 4 months of repair work, however, would be required before the Soengaigerong refineries could reach production of 60,000 tons. Maintenance at the Pladjoe field and refineries has been carried out under the direction of K. Aoki, a Japanese civilian, with a force of Japanese, Indoneasians, Chinese, and British Indian workers.

In addition to Shell's prewar 45,000-bbl. daily refinery at Palembang, a 47,000-bbl. refinery, is owned by Nederlandsche Koloniale Petroleum Maatschappij, a subsidiary of the Standard Vacuum Oil Co., which in turn is jointly owned by Standard Oil Co. (New Jersey) and Socony-Vacuum Oil Co., Inc. The N.K.P.M. refinery actually is located 5 miles downstream from the city of Palembang.

International

Anglo-Iranian Answers Exploitation Charges

LONDON. — Sir William Fraser, chairman of Anglo-Iranian Oil Co., Ltd., answering alleged Russian charges that British employers were exploiting Iranian labor, told company stockholders of measures taken by the company to promote its employes' well-being, of extensive housing programs, hospitalization and school construction.

"Under a housing program started in 1939," he said, "the company constructed some 14,000 houses until the project was interrupted by the war. The program now is being resumed. Company physicians treated 9,500 hospital cases, more than 500,000 dispensary patients and more than 130,000 other employes in their homes.

"Anglo-Iranian has built 17 schools and approximately 1,700 young Iranians are being trained under the program initiated in 1923. The company has also helped develop food production and price control in Iran, and has provided electric service and built roads in the town of Abadan."

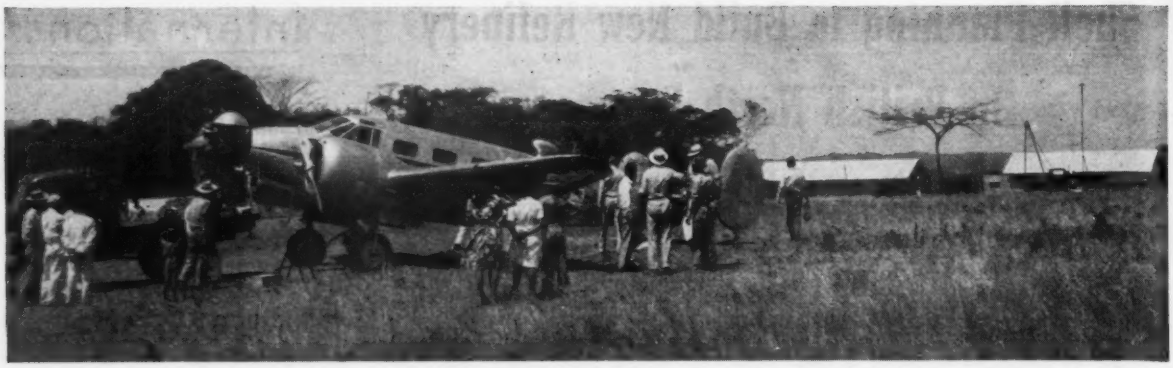
Barber Asphalt's Venezuelan Royalties Sold to Shell

NEW YORK.—Barber Asphalt Corp. has sold its Venezuelan royalties to Shell Petroleum Corp., Ltd., for a reported $25,000,000. The majority of Barber's concessions are in Mene Grande field. The sale includes other undeveloped Venezuelan areas.

Shell has produced from Barber leases for the past several years. The sale is subject to Barber profits being taxed as a capital gain and to stockholders' approval. A stockholders' meeting is slated for early fall. The company estimates net profits will be $18,000,000 after payment of expenses and taxes. Pres. Torkild Rieber made the announcement of the transaction.

Venezuelan Duty Cut

WASHINGTON.—Venezuela's import duty on lubricating oils and greases has been reduced from 0.4 bolivares to 0.2 bolivares (about 6 cents), it is reported by the Bureau of Foreign and Domestic Commerce of the Department of Commerce.



Yaure camp of Socony-Vacuum Oil Co., Inc., in a remote part of southwestern Venezuela receives all supplies by airplane for maintaining drilling and seismograph crews

Socony-Vacuum Explores Barinas, Venezuela's Largest Concessions

by Paul Reed

THE largest exploration undertaking in Venezuela is the project being pushed by Socony-Vacuum Oil Co., Inc. of Venezuela, under the direction of Harold L. Fry, general manager, in the state of Barinas and in the adjacent states of Apure and Táchira where the company has concessions totaling 1,351,558 hectares (3,339,700 acres). These represent the most extensive concession holdings of a single company in any of the exploration areas of the country. In fact they amount to more than 10 per cent of all the existing concessions in Venezuela.

In the early months of this year Socony-Vacuum had six geophysical parties working in Barinas: one gravity meter and five seismograph parties. Of these, four were parties of the Socony-Vacuum organization, while two were contracted.

Two rigs have been drilling simultaneously and a third has been on order to accelerate the program for testing the region to obtain data needed for deciding which parcels of the concessions will be relinquished in 1947 in converting from exploration to exploitation status required by the 1943 law.

In addition to the three initial wells drilled with two rigs in Barinas, Socony-Vacuum is planning to drill three or more wells this year. The first three wells have been drilled as follows: The initial well, 1 San Vicente, dry at 7,082 ft., was drilled 105 km. southeast of the town of Barinas. Soon after starting 1 San Vicente, operations were started on 1 Silvestre, 60 km. southeast of Barinas, and this was abandoned recently below 10,000 ft. The rig from 1 San Vicente was moved to drill 1 Yaure to a proposed depth of 7,000 ft. at a location 150 km. southwest of the town of Barinas and 16 km. southwest of the town of Santa Bárbara.

Before Socony-Vacuum entered Barinas, Sinclair interests had drilled a wildcat between the towns of Barinas and Barinitas to a depth of 5,525 ft. Because of the difficulty in reaching the Barinas area, very little geological data had been obtained before Socony-Vacuum undertook its exploration program.

The Barinas basin is believed to be fairly narrow and deep near the mountains. Southeastward the formations thin toward the Guiana shield and 1 San Vicente was essentially a stratigraphic test in an area where a condensed section was suspected.

Most of the seepages in the state of Barinas are identified with formations of questionable Eocene age. The original sources of the oil are not known. Beyond a narrow area close to the mountains, the Younger Tertiary is covered by Quaternary deposits.

Located as it is in southwestern Venezuela, the state of Barinas is the country's least accessible region. Therefore, the transportation of equipment and supplies presents serious problems for exploration on the scale of Socony-Vacuum's operations.

The distance from the seaport of Maracaibo to the part of Barinas where Socony-Vacuum's 1 Yaure is

This map shows the Venezuelan state of Barinas where Socony-Vacuum has under way the largest exploration undertaking in the country

located is only about 335 km. (208 miles) in a straight line. However, the route between these points is unsatisfactory for many shipments because of inadequate facilities. Traffic is handled by lake boat across Lake Maracaibo, by river boat up the Catatumbo River to Encontrados, by railroad from there to Táchira, and thence by trucks via San Cristobal over the mountains and down into the llanos of Barinas.

In spite of the inevitable delays over this route, it has been utilized for refined products deliveries. During the dry season from December to May, supplies of gasoline, diesel fuel, and lubricating oils are brought in via the Maracaibo-San Cristobal route. These are accumulated at the points where operations are to be carried on preparatory for the rainy season which usually lasts from May to December.

For bringing in heavy drilling equipment there are two long, expensive routes: One by land from Puerto Cabello and the other by the Orinoco River. Since the land route is less costly, an effort is made to truck as much equipment as possible from Puerto Cabello to the main distribution camp near Barinas, a distance of about 455 km. (282 miles) by road. This route is not usable in the rainy season because it crosses a large number of unbridged streams. In the dry season it is advisable to move in as much refined-products supplies from Maracaibo and heavy equipment from Puerto Cabello as it is possible to do. On the Puerto Cabello road there are numerous unbridged streams. Some straightening of this road is being done. On the road from Yaure to San Cristobal the trucks must be ferried on rafts at two river crossings.

Transportation by truck from Puerto Cabello in the dry season is faster than by water up the Orinoco. But if shipments must be made in the rainy season they can be brought up the Orinoco River and its tributaries to points near the company's operations. Shipments up the river are made by company owned barges and by chartered craft. A shallow-draft barge of a military landing-barge type has advantages for such a project.

While trucks can move geophysical equipment readily in the dry season, mules must be utilized in the rainy season. There have even been oxen in this service at times. Feed for mules has often been flown in by airplane. Camps are moved in the rainy season by pack mules and small tractors.

Socony-Vacuum has a farm in Barinas for keeping mules through the dry season so that they may be available in the rainy season. In the routine of the company's office at Barinas is a live-stock report of the number of mules and oxen on hand.

A large amount of supplies is delivered by chartered airplanes available for Socony-Vacuum for 3 days in the week. These travel between Maiquetía airport (near La Guaira) and various company operations in the state of Barinas. The company has been developing a program for having an additional plane at the disposal of the supervisor of geophysical parties so that he may visit these parties daily.

During a visit to Barinas this year, the author had an opportunity at Yaure to observe how Socony-Vacuum operates. Yaure is 150 km. southwest of the town of Barinas, capital of the state of Barinas and 16 km. southwest of the town of Santa Bárbara near the foot of the mountains.

A few kilometers from the camp on high, open ground is the wildcat test, 1 Yaure, by a stream running through dense jungle. Beyond the jungle is an open grassy savannah. In one of the groves—like an island in the savannah—there was the camp of a Magnolia seismograph party from Texas which had been moved to Barinas for the dry season. This seismograph party in the vicinity of Yaure was doing continuous reflection shooting in holes averaging 50-60 ft. deep at the rate of 20 to 30 profiles per day.

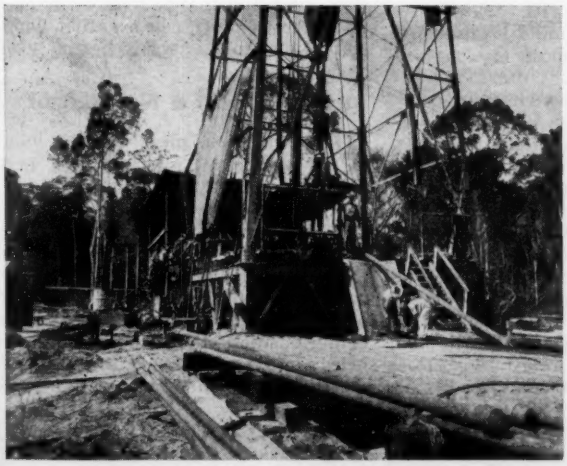
The rig for drilling 1 Yaure has three Caterpillar No. 8 diesel engines, a 122-ft. derrick with 24-ft. base and equipment adequate for the proposed depth of 7,000 ft. The company intends, however, to standardize on 136-ft. derricks with a 26-ft. base.

The general drilling practice of Socony-Vacuum in Barinas is as follows: The well is spudded in with a 17½-in. bit. After setting 200 to 400 ft. of surface pipe the hole is reduced to 12¼ in. for drilling to 2,500-4,000 ft. for the 9⅝-in.; drilling with 8½-in. bit is done until 6-in. is set.

In the upper part of the hole down to 4,400 ft., mud was being treated with sodium tetraphosphate, hexameta phosphate, and quebracho. Supplies of bentonite and barites were on hand for future needs. There were two pits 12 by 12 ft. and 12 by 14 ft. holding 200 to 300 bbl. of mud. A 500-bbl. mud tank was a reserve factor. The reserve mud pit was 75 by 50 ft. and 10 ft. deep at the deepest part. The well is started with natural mud and bentonite.

Venezuelan crews of roughnecks are recruited in the area and trained on the job. Moving in, rigging up, spudding in, and the general routine of rig operation are done by Venezuelans who had never seen a drilling job. At the Yaure camp a supply dump of several hundred drums of refined products was being accumulated in preparation for the rainy season. All truck equipment required for moving a drilling rig must be held near the rig for the period of drilling the well so as to have it immediately available when needed.

Drilling rig at Socony-Vacuum's wildcat test, No. 1 Yaure



Camp of a Magnolia seismograph party surveying in the Yaure area in the State of Barinas, Venezuela

WASHINGTON WATCHING

BY HENRY D. RALPH

New Subsidy Policy

WASHINGTON.—The stripper well subsidy payments will be paid to crude purchasers for all July production at the rates which were in effect June 30. Reconversion Director John R. Steelman has told the Reconstruction Finance Corporation.

Steelman announced that the RFC and the Office of Price Administration are now preparing new regulations providing for the continuation of subsidy payments after August 1. This implies that the subsidy will be continued for some time but that the rates may be reduced. Steelman's office also directed the OPA to continue to make changes in the list of pools entitled to the premium price until a final policy has been set.

The Big Inch Offers

SOCIAL reformers in the administration should be well pleased with several of the big-inch bids, particularly that of Trust-Buster Thurman Arnold. He proposed a cooperative of independent refiners along the Atlantic Seaboard (of which there are exactly none), independent jobbers, and local gas companies, financed entirely by a government loan, and administered by a mixed board of federal and municipal officials, labor representatives, and users of the line. The best part of this bid was a dissertation on the evils of monopoly and the social benefits of a mixed government and cooperative operation.

Several other proposals envisaged independent oil operators flocking to join some type of cooperative which would compete with the majors. It is conceivable that such a plan might succeed, but it is more likely most independent producers would prefer the monthly checks from the majors, and the independent refiners would have other places to invest their surplus capital.

Before the lines are sold there may be a good deal of talk about co-ops and other forms of operation, but it is significant that the firmest bids were from those who proposed to follow the orthodox pattern of operation.

There were a number of surprises in the offers made for disposal of the big-inch pipe lines.

One of them was the large number of high cash offers. It appears that the War Emergency lines are not the white elephants they were once considered. Proposals to buy for oil use ranged all over the lot, from far below to considerably above the offers for gas use. This suggests that these bidders have not made as careful economic surveys as the gas interests. Also, most of the oil proposals were vague about financing plans, sources and markets for oil. Also, most of them admitted that they might have to convert the lines to gas if the oil venture failed. In marked contrast were three or four of the gas bidders, who gave every evidence of knowing their business and supplied details of financial backing, economics and engineering studies, gas reserves and market prospects.

Another surprise was the number of bids received from unknowns. Some of these bids sounded like purely speculative promotion schemes. Others sounded sincere but appeared to be shoe-string operations based largely on faith, hope, and—in some instances—charity. There was some suspicion that some of these unknowns might be "fronting" for big interests, though there was no evidence of such.

It was a surprise to some people, though not to the oil industry, that no major oil companies offered to buy the lines. A large part of the public, and of Congress, can't get over the belief that the big-inch lines are desirable plums as oil carriers.

On the whole the 16 proposals pretty well substantiated the conclusions of most oil industry and other engineers that the lines are well suited for gas transmission and could be used for oil only if acquired at a low cost and after extensive relocation and construction of branches.

Although the best offers to buy the lines came from bidders who propose to convert them to natural gas, there is no assurance that they will ever be so used. In the first place, WAA will have to swallow its earlier position that the lines should be used for oil. Then it will propose to Congress that one of the gas offers be accepted, and Congressmen from coal-producing regions can be counted on to make a determined fight to defeat the proposal. Every one of the gas offers was contingent upon obtaining a certificate of public convenience and necessity from the Federal Power Commission.

Among the big-inch bids proposing use for oil were two which would definitely upset the economics of the oil industry. One of these was the Glasco proposal to relay the 20-in. line to carry crude from West Texas to California. Much more disruptive would be Paul Ryan's plan to reconstruct both the crude and products systems to serve markets in the Great Lakes states. This would give Gulf state producers and refiners access to markets now served either from the Atlantic seaboard or from the northern Mid-Continent area, and, Ryan said, at considerably less cost than at present.

Supreme Court Views

FAILURE of the tidelands quitclaim resolution to become law would have created no fears back in the old days of separation of government powers and consistency of judicial precedents. Then there would have been no doubt that the Supreme Court would adhere to the trend of some 50 previous decisions and rule that the states, not the federal Government, have title to all submerged lands off their shores and any oil that might be found in them.

Nowadays no one can predict what the Supreme Court may say, and about the only thing certain is that there will be dissenting opinions. The present justices had little legal and less judicial experience before being appointed to the court. Legal precedent and judicial interpretation mean less to them than their personal economic predelictions, and these, on the whole, appear to be toward a strong central government, subjugation of state rights, and support of the executive branch. Therefore it is not inconceivable that the court will pay little attention to the legal arguments about land titles and the conditions on which the various states joined the Union but will be swayed by the nonlegal hypothesis that the tidelands issue is between "conservation" versus "waste" of petroleum, the hypothesis being that federal ownership is unquestionably conservation while state ownership is waste per se.

Mr. Coffee in a New Light

WITH malicious pleasure some long-memoried oil men watched Rep. John M. Coffee, Democrat, Washington, squirm last week before the Senate war investigating committee.

The Honorable Coffee is one of the "professional liberals" in the House, prone to sound off against the evils of private enterprise, the crookedness of big business, the greed of reactionaries, and particularly the untrustworthiness of the big bad oil com-

panies. One of his favorite accusations was that the Independent Petroleum Association of American is nothing but a stooge of the wicked majors, based on the fact that, years ago, some of the majors contributed to a fund sponsored by I.P.A.A. to prepare a presentation to Congress in defense of retaining the oil depletion allowance in the tax law. In many other ways he has been a sanctimonious fly in the ointment of government-industry relations.

Last week the Senate investigation revealed that Coffee and his secretary had accepted a check for $2,500 from a constituent who was seeking a war contract. The contractor testified the check was a fee for services in obtaining the contract (but said he was gypped because he didn't get service). If so it was a clear violation of law by both parties, but the contractor kept mum until the statute of limitations had run out. Coffee testified it was a campaign contribution.

In addition to suggesting that professional liberals are apt to be liberal with other peoples' money and susceptible to the lure of reactionary dollars, this incident gave the Press Gallery punsters a field day with gags about Coffee going through the grinder, being of the drip variety, etc. ad nauseum.

A Delay for the Navy

THE Navy has finally returned to its owners the Toledo refinery of the Gulf Oil Co., the last of 49 refineries and four pipe lines seized by the Government October 5, 1945, to settle the strike which threatened to disrupt business throughout the Eastern and Midwestern states.

Privately, Navy officials are pretty bitter about the delay of this plant in reaching a settlement of the labor dispute. They had hoped to get out of the oil business very quickly, having no taste for seizing and operating private properties even though the seizure was technical and the operation nominal. The Navy took no part in the labor-management negotiations, but sat tight until an agreement was reached.

Five T-3 Tankers Sold

THE Maritime Commission has sold all five of the T-3 type tankers available under the surplus ship-sales act, and sales of the plentiful T-2 type are being made steadily.

There were 15 applications for T-3's, the most modern type of tanker, but only five have been declared surplus since the remainder are still being used by the military. Their sale price is adjusted for the condition of each vessel but is somewhere between the statutory price of $1,903,125 and the floor price of $1,485,015.

One each of the T-3's was awarded to Cities Service Oil Co., Gulf Oil Corp., Hillcone Steamship Co., Richfield Oil Corp., and Sinclair Refining Co.

Sales of T-2 tankers announced last week included one to the Kingdom of the Netherlands, the first foreign sale of a tanker; two each to Pan American Petroleum & Transport Co., Standard Oil Co. of New Jersey, Barber Asphalt Co., and one each to Motor Tankship Corp., and Sun Oil Co.

NPC Meeting Set

THE next meeting of the National Petroleum Council will be held in Washington September 26, it has been agreed by both Secretary of the Interior Krug and Temporary Chairman Walter S. Hallanan. Hallanan has asked the organizing subcommittee to prepare their recommendations promptly so that a report of the full organization committee may be circulated to the Council members by September 15.

Testimony From Labor Officials Ends FPC's Natural-Gas Hearings

WASHINGTON.—The Federal Power Commission ended its lengthy natural-gas hearings last week with arguments from coal and railway labor interests that unrestricted use of gas is leading to rapid exhaustion of reserves and injury to coal miners and railroad employes.

Among the last to testify were Thomas Kennedy, secretary-treasurer of the United Mine Workers, who declared that expanded use of natural gas will cause unemployment and lower standards of living in the coal fields, and A. C. Lyon, secretary of the Railroad Labor Executives Association, who testified that the displacement of coal by natural gas is jeapordizing the welfare of railway employes.

Most of the final week of the investigation was devoted to cross examination of the witnesses for the Natural-Gas Industry Committee, particularly E. Holley Poe. Both members of the commission and Tom McGrath, counsel for the coal interests, read excerpts from speeches by Poe and others in the gas industry which were highly critical of the FPC, and they questioned him at length about his views, the statistics and exhibits he had presented, and the general attitude of the natural-gas industry.

Simplified Procedure Advocated

Poe replied that the speeches repsented personal opinions only but he admitted that the industry had been highly critical of some of the FPC decisions and had violently opposed starting the natural-gas investigation during wartime. He said that he feared that some of the commissioners had views which, if put into effect, would result in stopping the growth of the natural-gas industry, but that he had modified his opinions somewhat as a result of this investigation. However, Poe adhered to his earlier position that FPC hearings are too detailed and time-consuming and he advocated simplified procedures and particularly some restraint on intervenors such as the coal interests which, he said, operate chiefly as obstructionists and attempt to hamstring the gas industry in all possible ways.

In a colloquy with McGrath, Poe said that an unregulated industry, coal, should not attempt to use government machinery to suppress the competition from a regulated industry, gas, and that if coal is having difficulty competing with gas the coal industry should engage in research and put its own house in order so that it can meet this competition in the market place instead of trying to stifle progress by government regulation.

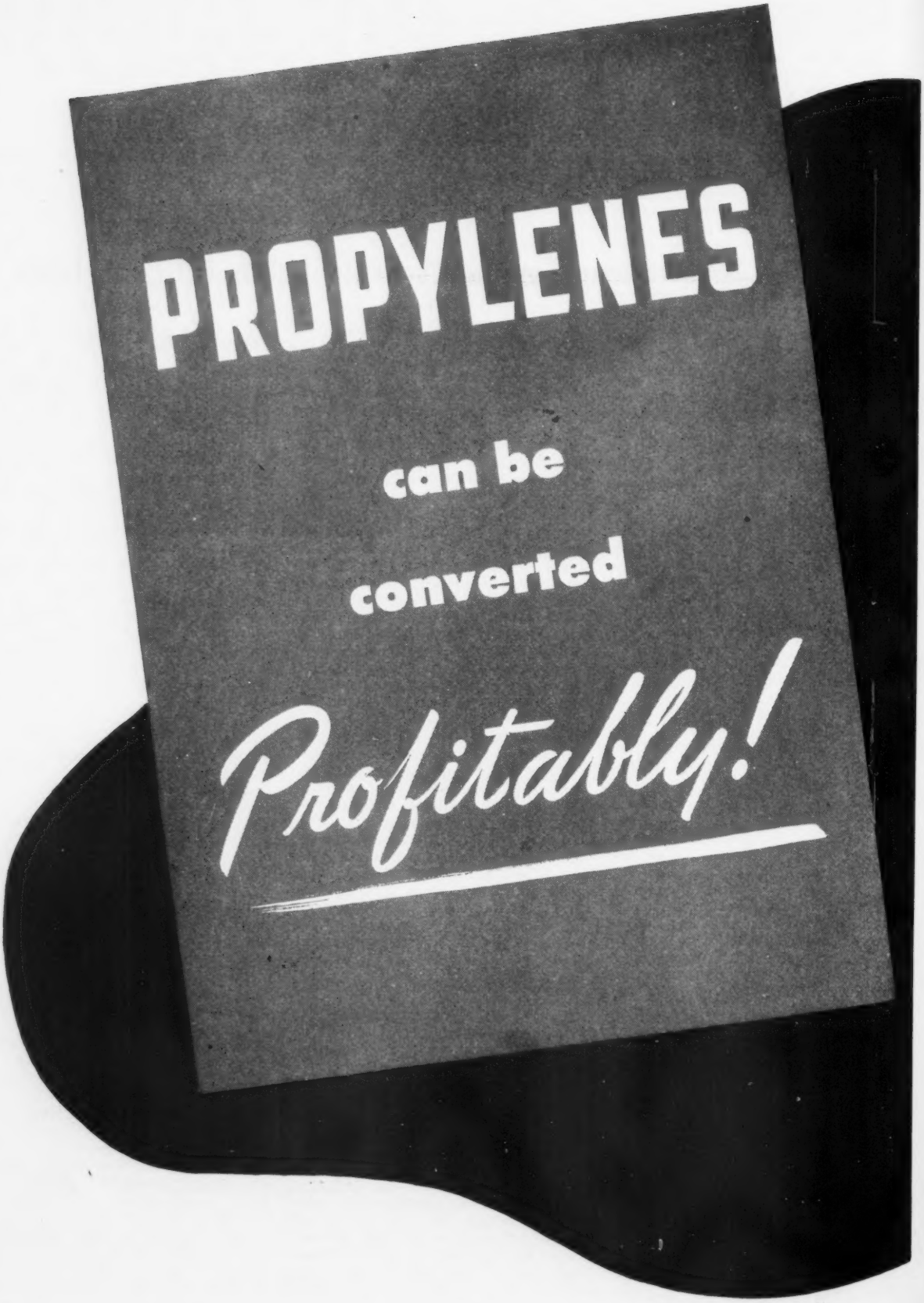
West Texas Shutdown Days Boosted to Nine

AUSTIN, Tex.—West Texas oil fields will be required to shut down nine days during August instead of the seven originally scheduled, the Railroad Commission announced last week. The action leaves only 22 producing days in the Permian Basin, compared to 26 generally over the state.

The reduction, attributed to increasing storage and lack of pipe-line facilities to move the production, will lower average allowables for that area approximately 30,000 bbl. daily to 528,938 bbl.

Sunray Merger Effective

Merger of Transwestern Oil Co. into Sunray Oil Corp. became effective August 2, officials of the company announced last week. As a result of the merger, approved July 19 by stockholders of both companies, Sunray's daily production will be increased to approximately 35,000 bbl. and crude reserves more than doubled.


PROPYLENES
can be
converted
Profitably!

Physics Laboratory Heads New U.O.P. Research Facilities

by Arch L. Foster

CHICAGO.—Realizing fully the tremendous and increasing importance of applied physics in modern process research, Universal Oil Products Co. has recently installed the physics division of its Riverside laboratories in a new building and has added latest available equipment to aid the division in its work. Taking its place in the large group of buildings which house this well-known research organization the physics laboratory contains the most advanced equipment available to scientists for highly involved studies in refining-process development.

G. M. WEBB

The new building was designed largely by the scientists who work in it and is separated into units, each devoted to one of the several types of research. The main items of equipment and auxiliary apparatus include spectroscopic apparatus for the use of ultraviolet light, visible light, infra-red and Raman equipment; microphotometers, X-ray and electron diffraction units; a mass spectrometer; an electron microscope and numerous other assemblies for measuring surface areas, dielectric constants, porosities, freezing points, and many other important determinations.

The new laboratory building is 105 ft. by 32 ft., with an eaves height of 13 ft. It is divided into three office rooms, a wash room, a dark room, a general laboratory, and rooms devoted to infrared spectroscopy, Raman and ultraviolet spectroscopy, the emission spectrograph, the electron microscope, the mass spectrometer and X-ray diffraction units and a standards room. Water, steam, air, vacuum, and electric lines are brought into the building in a trench, led to the attic through a well, and from there are distributed to the various rooms. Individual panels are installed in each room where necessary. The sensitive and accurate instruments are mounted on pipe columns set in concrete bases in the ground, thus avoiding vibrations which might make accurate readings impossible.

The personnel of the unit includes a group of highly specialized physical scientists, whose work is correlated with that of all other units of the research organization.

Only in recent years, said C. G. Gerhold, manager of the Riverside laboratories, has industry realized the importance of physical science in research. With the development of many different instruments, the physicist is able to study materials and reactions hitherto not possible.

Chemical Research

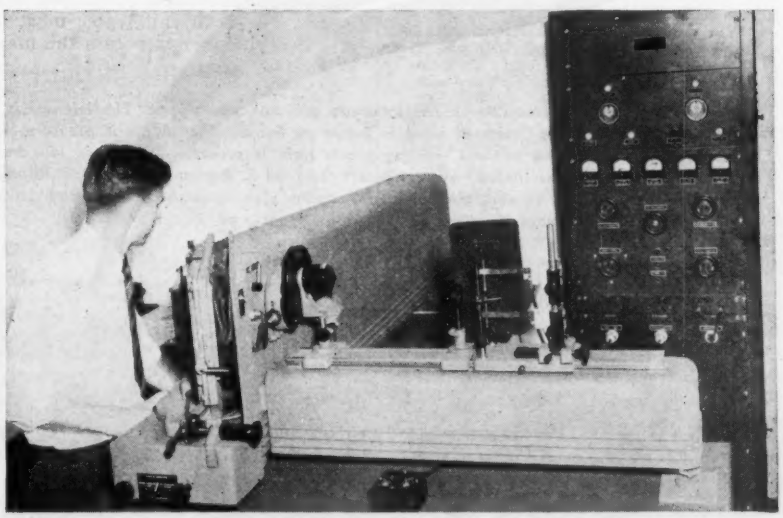
Most research in the oil-refining industry in the past has been chemical research with physics in a minor role, Dr. Gerhold said. Now the line of demarcation between chemical and physical investigation is more and more indistinct, with the two sciences merging into one great field. For example, the study of catalysts and catalysis has become one of the most important in oil refining. Catalysis is considered to be mainly a surface phenomenon and good solid catalysts are porous materials, the porosity increasing greatly the exposed surface of the material.

Under the conventional glass-lensed microscope, magnification of 1,000 diameters is about the greatest obtainable, and at that magnification, pores in fuller's earth, kieselguhr, etc., are barely discernible. With the electron microscope many times this magnification can be obtained with comparative ease, and under this instrument the infinitesimal pores of materials show clearly. In fact, some appear to be partitioned into a group of parallel holes. By this means substances may be chosen for catalysts which have the best properties of a catalyst, including large surface areas, and enable the scientist to correlate physical microstructure with catalytic activity.

Similarly, X-ray diffraction investigations enable the scientist to ferret out difficulties with catalysts and to correct bad practices in handling or in manufacture of catalysts. In one instance during the war, the hydroform process was used largely to produce benzene, toluene, and other aromatics for war purposes. In studying the alumina-molybdic oxide catalyst used in this process, X-ray diffraction showed that some crystalline material was present in the regenerated catalyst which was not found in fresh catalyst, and this proved to be alpha-alumina, a form without catalytic activity. It was discovered that improper heating during the regeneration produced this alpha form, reducing the catalyst's activity; correction of the regeneration procedure eliminated the difficulty, discovered by the diffraction study.

The mass spectrometer is proving to be a major tool in studying processing methods and results, G. M. Webb, director of the physics laboratory, pointed out. Its use has enabled the researcher to follow closely the composition of the gases from the regeneration cycle in fluid catalytic cracking and thus to control that operation more efficiently.

The function of infra-red spectroscopic work ranges widely, from routine analyses to following chemical reactions. By measuring the intensity of light transmission, it is practicable to determine the composition of alkylates, hydropolymers, and other aviation-gasoline components rapidly and exactly.



A quartz-emission spectrograph in Universal Oil Products Co.'s new laboratory

Salt-Water Disposal IN EAST TEXAS FIELD

Part 1 . . . How the World's Largest Brine Injection Project Is Handled

by W. S. Morris*

FROM the time the first wells were drilled on the west side in 1931, salt water has been produced in the East Texas field. By the end of 1933, there were 3,145 wells producing a total of 7,800 bbl. of salt water per day. Therefore the production of salt water in the East Texas field has been a problem practically from the start.

Fig. 1 shows the East Texas oil field to be a monoclinal-type structure with the Woodbine sand pinching out to the east against the Austin chalk which serves as an impervious barrier. The shale and limestones overlying the Woodbine sand form impervious barriers above the oil sand, containing in the stratigraphic trap with the original oil-water contact at approximately 3,300 ft. below sea level. The Woodbine sand has many shale streaks which effectively separate various oil strata. However, the shale streaks are not believed to be continuous throughout the reservoir, but have been estimated to occupy as much as 35 per cent of the volume of the Woodbine section.

Original bottom-hole pressure in the field was 1,620 psi. at —3,300 ft. The Woodbine sand has an average porosity of approximately 26 per cent and an average permeability of 2,500 md. Investigations of the Bureau of Mines (R.I. 3212) found that the oil in the reservoir was undersaturated with gas and that the gas did not start to come out of solution until a pressure of 755 psia. was reached. The study also showed the dissolved gas to be 379 cu. ft. per barrel of oil and the reservoir temperature to be 146° F. The volumetric reduction from reservoir conditions to atmosphere was found to be 20.6 per cent.

Water-Drive-Type Reservoir

The field very definitely is a water-drive field and possesses all of the characteristics of this type of reservoir. It is inevitable therefore that production of salt water must be controlled in order to obtain the maximum ultimate recovery of oil. Early studies[1,2] determined the relationship between the rate of production of the field and the pressure behavior. As more wells were drilled on the west side and more oil withdrawn from the reservoir it was a natural consequence that the water production should increase. Table 1 shows further data with reference to the wells producing salt water. The salt-water encroachment is now general all along the west side of the field.

Early Methods of Disposal

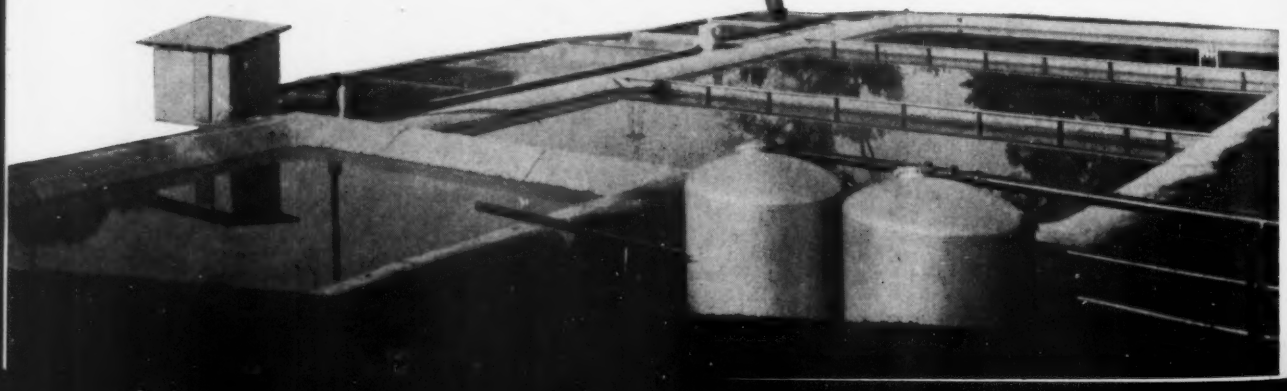
Early in 1936 feasibility of returning salt water to the Woodbine sand was tested in an experimental well located about 2 miles west of the productive limits of the field.[3] Other methods for disposing of salt water in the field included evaporation in open earthen pits; evaporation supplemented by use of artificial heat furnished from gas flares; more or less continuous release of salt water into surface drainage; and storage of salt water in earthen pits with controlled release during periods of heavy rain fall.

Transportation of the salt water to the Gulf of Mexico by pipe line also was considered. The subsurface disposal of water was felt to be the most practical method after the experimental project proved that salt water could be successfully injected into the lower Woodbine sand.

As salt water production increased, the problem of stream pollution became more acute.[4] On November 8,

*Vice president and general manager, East Texas Salt Water Disposal Co., Kilgore, Texas.

(Above)—Crossing at Bowles Creek. The lines are asbestos-cement pipe. The left one is a gravity line from Hamilton-Gambrell lease to Zeppa pit (class 100). Middle is pressure line (class 200) from Zeppa pit to Cook treating plant; right is pressure line (class 150) from Blackwell pit to Zeppa pit. (Below)—Water enters the John R. Suman treating plant through the oil skimming pits (far corner), goes over an aerating slab, through a chlorination basin, thence into main treating pit via 3-in. "over and under" pipes.



1939, an injunction suit was filed by the attorney general against 146 operators producing salt water in the southern part of the field, which constitutes a part of the drainage area of the Neches and Angeline water sheds, to keep them from polluting the area with salt water. The cities of Beaumont and Port Arthur, located down stream, contended that their fresh-water supply for domestic and industrial uses was being rendered unfit for use by reason of high salt concentration.

At the time the suit was filed there were eight salt-water-injection systems operating in the south part of the field. During November 1936, they injected 15,695 bbl. of water per day although the area was producing in excess of 100,000 bbl. of salt water per day.[5] A final agreement was reached whereby the operators agreed either to return the water to the Woodbine sand or construct impervious pits large enough to hold 5 months' water production of their leases. The agreement provided that the water would be stored during periods of little rainfall and be released into the streams when the flow was such that the percentage of water pollution would not be objectionable. Many salt-water pits were constructed and several additional salt-water-disposal systems were installed by the larger companies. The companies with small and scattered leases were at a disadvantage in providing themselves with facilities for the subsurface disposal of salt water because of the expense involved.

Growth of Salt-Water-Disposal Systems

By the end of 1940 there were 31 salt-water-injection wells in operation, injecting 50,374 bbl. of water per day. (Yearly increase in the number of salt-water-disposal systems is shown in Table 2). However, more than 200,000 bbl. of water were being produced per day. By the summer of 1941 the problem reached alarming proportions. A campaign of plugging back wells to shut off water was conducted without too much success.[6]

Problem Discussed with Railroad Commission

Most of the operators in the south end of the field were under a court injunction against dumping salt water, so a group of operators composed of both large and small companies sought relief. At a hearing of the Railroad Commission of Texas on July 29, 1941, Joe Zeppa of Delta Drilling Co. proposed that he be permitted to drill a salt-water-injection well and connect the leases of other operators who were producing salt water. While the commission was considering this, a new proposal was drafted by a group of operators and at a further hearing on October 6, 1941, it was proposed that an additional allowable of 1 bbl. of oil for each 50 bbl. of salt water returned to the sand be granted. The Railroad Commission was told that if such an order were issued an attempt would be made to organize a corporation to take care of all the salt water produced in the field.

As a result of these hearings Order 6-3142 was issued by the commission, effective January 1, 1942, in which an additional allowable of 1 bbl. of oil for every 50 bbl. of salt water returned to the sand was granted. The commission did not grant the request to shut down large water wells and transfer the allowable at that time.

Salt-Water-Disposal Company Organized

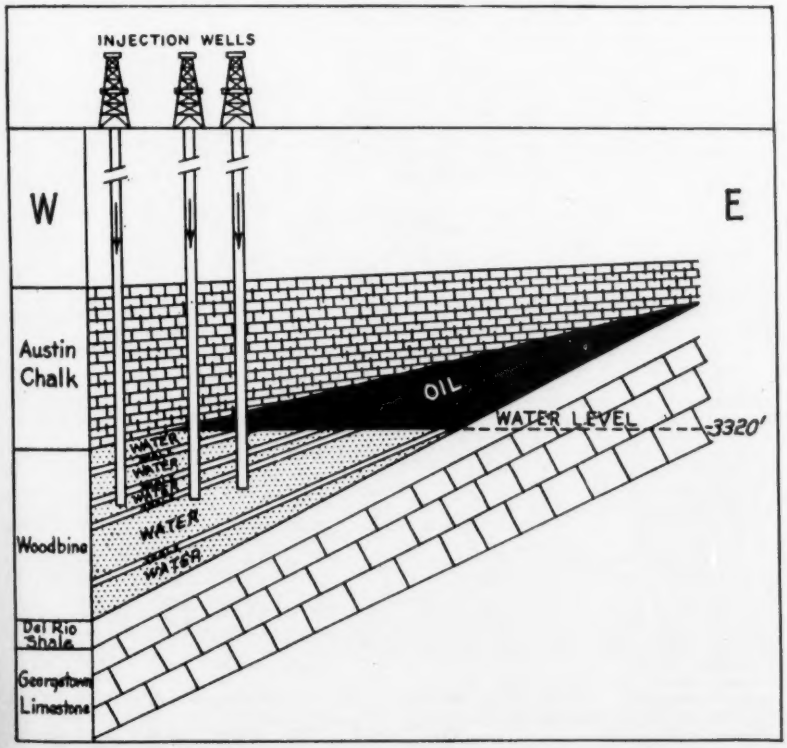
Following the issuance of Order 6-3142 a meeting of East Texas operators was held on November 25, 1941 to formulate an organization looking toward the field-wide disposal of salt water. On January 8, 1942, the "East Texas Salt Water Disposal Co." was organized as a Texas corporation with a capital stock of $25,000.

Large and small operators alike were represented in this organization.

It was decided that much salt water could be shut in while the facilities for subsurface injection were being provided if the commission would permit the shutting down of large water wells and the transfer of the allowable to other leases. The commission issued Order 6-3437 effective April 1, 1942, in which the transfer

This is the first of a series of articles dealing with the salt-water-disposal project in the East Texas oil field, the largest such operation in the world. They comprise the first complete description of the project and are written by the engineering expert who is in active charge of the work. Conditions in the field that brought about the formation of the East Texas Salt Water Disposal Co. as a field-wide project are recorded. Setup of the organization is presented for the benefit of operators in other fields. Manner in which the whole field pays for the return of salt water to the Woodbine sand for the maintenance of reservoir pressure is explained fully. The technical problems and engineering solutions dealing with the subsurface disposal of salt water are presented in the light of the experience of the Salt Water company, together with the results accomplished to date. Many references to current literature dealing with the problem of salt-water disposal are cited.

Fig. 1—West-east cross-section of East Texas field, and location of the water injection wells. Altogether there now are 77 such wells, handling 439,000 bbl. of water per day



of the additional allowable for the return of salt water could be transferred to leases other than the one on which the water was produced. This order was necessary to permit leases on which there were only marginal wells to take advantage of the additional oil for the injection of salt water. Order 6-3437 also permitted wells producing more than 100 bbl. of salt water per day to be shut in and the allowable taken from other wells on the same lease. On February 25, 1942, Order 6-3456 was issued permitting the shutting down of large water wells to be made effective March 1, 1942.

Large Water Wells Permitted to Shut Down

During March 1942 there were 79 large water wells shut down which had a daily water production of 20,176 bbl. During April 1942 there were a total of 90 large water wells shut in with a saving in water production of 22,729 bbl. per day. It had been anticipated that as much as 100,000 bbl. of water per day would be immediately shut in under the commission's order, but this figure was not reached until September 1943. The maximum volume of water shut down was probably in October 1943 when over 105,000 bbl. per day were affected. As of July 1946 the volume of water represented by such wells shut down is approximately 55,000 bbl. per day. Unquestionably the order resulted in the keeping in the ground of considerable water that would have otherwise been produced.

Salt-Water Company Expanded

The stockholders of the East Texas Salt Water Disposal Co., in less than a month from the time it was organized as a $25,000 Texas corporation, decided to undertake to increase the capital of the company from $25,000 to $2,000,000 by selling an additional 19,750 shares of common stock, par value $100, at $100 per share, thereby securing sufficient capital to provide facilities to handle a larger portion of the water produced.

Before the stock could be sold, all of the requirements of the Federal Securities Act and the Securities Act of Texas were met. The stock prospectus was sent to all operators in the East Texas field. The offering was oversubscribed and some of the money received had to be returned.

Organization Perfected

At a meeting of the stockholders on August 25, 1942, at Dallas, Bryan W. Payne (Iowa Payne Oil Co.) was elected president; W. S. Morris (field chairman East Texas Engineering Association) vice president and general manager; J. H. Moyar (Stanolind Oil & Gas Co.) secretary-treasurer. Suitable by-laws were adopted, 21 directors elected and an executive committee of 6 chosen. After considerable discussion, the rate for handling salt water from the lease gunbarrel or treater through the necessary lines, treating plant and injection wells to the Woodbine formation, was fixed at 1.8 cents per barrel. This cost was to be the same all over the field regardless of the circumstances and location of the water-producing lease.

Plan of Operation

The plan of operation provided for the purchase by Salt Water Co. of those salt-water-disposal systems then in operation in the East Texas field owned by individual companies who were willing to sell and whose facilities fitted into the general plan of providing salt-water-disposal facilities for the entire field. Nine such systems were purchased.

The first company installation was made in the area immediately west of Kilgore where a large volume of water was produced and where very little water was returned to the Woodbine sand. The first injection well here was put into operation on January 3, 1943. (Up to June 1, 1946, the well, 1 Bryan W. Payne, had taken 15,522,795 bbl., which is the largest amount injected into any well in the field). By June 1946, the total salt water injection by all parties in the field had reached the point where 439,000 bbl. per day were being injected into 79 wells, and cumulative total injection was 476,610,475 bbl.

How the Salt-Water Company Operates

The salt water is taken from the individual water-producing leases through a gravity collection system of lines to a strategically located pit in the lowest point in the area. From this pit the water is pumped west to the treating plant and from there into the injected well. This is the layout for the Kilgore area and it has been duplicated many times on the west side of the East Texas field. The details of the operations are discussed later in this series.

The East Texas Salt Water Disposal Co. takes water from all operators alike regardless of whether they are stockholders in the corporation or not. The same charge per barrel is made to each operator regardless of the volume of water produced and regardless of the location of the water producing lease with respect to the facilities of the company. The charge of 1.8 cents per barrel makes it necessary for the operator to pay 90 cents for the disposition of 50 bbl. of salt water. The Railroad Commission grants an additional barrel of oil allowable for each 50 bbl. of water returned to the Woodbine sand. At the time the program was first started the price of East Texas crude oil was $1.25 per barrel which permitted the operator producing salt water to pay 90 cents to the Salt Water company for handling the 50 bbl. of salt water and have left 35 cents to cover the cost of the royalty, taxes, lifting costs, and other expenses. On the average, the 35 cents differential was just sufficient to meet all costs and as a result nobody made a profit on the production of salt water or on the production of bonus oil.

Under the Railroad Commission

TABLE 2—GROWTH OF SALT-WATER-DISPOSAL SYSTEMS IN THE EAST TEXAS FIELD

Year—	Injection wells in use	Salt water injected (bbl.)	Daily average
1938	1	223,053	611
1939	10	2,250,761	6,166
1940	31	10,965,939	29,962
1941	47	23,530,319	64,467
1942	49	29,635,976	81,194
1943	64	73,642,841	201,761
1944	74	124,136,102	339,169
1945	76	137,179,479	375,834
1946 (6 months)	79	75,046,005	414,619
Cumulative		476,610,475	

TABLE 1—EAST TEXAS FIELD WELL STATUS DATA BY YEARS (FROM RAILROAD COMMISSION RECORDS)

Classification of wells—	4-1-40	4-1-41	1-1-42	1-1-43	1-1-44	1-1-45	1-1-46
Flowing wells making water	948	759	1,118	877	843	1,045	971
Pumping wells making water	3,337	3,682	4,017	3,935	3,832	3,784	4,139
Pumping wells not making water	2,905	3,146	3,115	3,392	3,348	3,500	3,606
Total pumping wells in field	6,242	6,828	7,132	7,327	7,180	7,284	7,745
Air and gas-lift wells making water	331	458	524	535	502	412	200
Air and gas-lift wells not making water	454	429	455	462	532	516	474
Total air and gas-lift wells in field	785	887	979	997	1,034	928	674
Total artificial lift wells	7,027	7,715	8,111	8,324	8,214	8,212	8,419
Marginal wells making Woodbine water	....	757	927	959	1,120	1,276	1,097
Proratable wells making Woodbine water	....	3,606	4,732	4,388	4,057	3,927	4,213
Total wells making Woodbine water	4,416	4,363	5,659	5,347	5,177	5,203	5,310
Daily water withdrawals, bbl.—							
From marginal wells making water	....	....	221,632	210,209	229,049	270,078	232,206
From proratable wells making water	....	....	217,474	207,834	221,205	233,378	320,101
From all wells making water	179,681	387,653	439,106	418,043	450,254	503,456	552,307
Average daily withdrawal per marginal well	....	....	239.09	219.20	204.51	211.66	211.67
Average daily withdrawal per proratable well	....	....	45.96	47.36	54.52	59.43	75.98
Average daily withdrawal per water well	40.69	88.85	77.59	78.18	86.97	96.76	104.01

orders permitting the transfer of bonus oil from one operator and lease to another, a plan was evolved whereby the producer of salt water on a marginal lease could assign the bonus oil allocated to him by the Railroad Commission, to another operator in the field who would produce the bonus oil and pay the proceeds to the Salt Water company for the account of the salt water producer, at the rate of 90 cents per barrel of bonus oil assigned to him and produced by him. The plan has been perfected to the point where the producer of salt water makes a blanket assignment to the Salt Water company as its agent and in turn the Salt Water company assigns the bonus oil from month to month to various operators in the field with whom arrangements have been made for the production of the bonus oil. Under this arrangement, approximately 60,000 bbl. of bonus oil is assigned through the Salt Water company each month. Every producer of salt water who desired to transfer his bonus oil to other producers has been accommodated and conversely every operator who indicated a desire to participate in the production of bonus oil has likewise been permitted to do so.

W. S. Morris, the author, was graduated from North Carolina State College with a degree of B.S. in 1924, and received the C.E. degree in 1927. He was junior engineer for Empire Gas & Fuel Co., 1924 to 1926, petroleum engineer for U. S. Bureau of Mines at Bartlesville, 1926 to 1929, and with Indian Territory Illuminating Oil Co., 1929 to 1936. He studied law in Oklahoma City and was admitted to the Oklahoma bar in 1936. From 1936 to 1942 Morris was field chairman for the East Texas Engineering Association, before being elected to his present position of vice president and general manager of East Texas Salt Water Disposal Co. at the time of its organization in August 1942.

Plan of operation has become so simplified that the Salt Water company acting as agent for many of its customers, makes all the assignments and handles all of the paper work in connection with the plan. The producer of bonus oil makes his payments to the Salt Water company for the account of the individual customer. In the event an operator produces more salt water than the amount for which he is granted bonus oil, it is his obligation to pay out of his pocket for the injection of such "excess water."

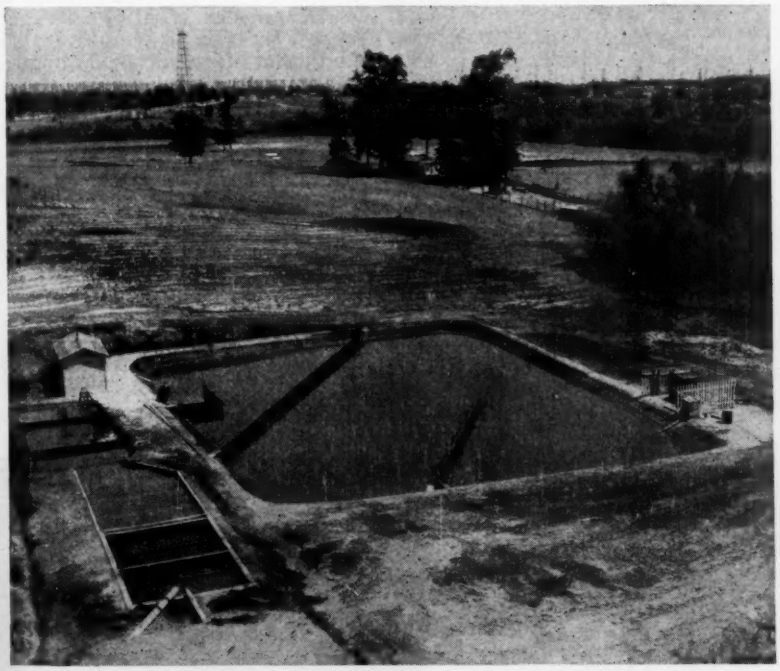
The plan has worked so smoothly that there have been few complaints and very few past-due accounts. The Salt Water company permits its customers to take a 2 per cent discount on their invoices for payment before the twentieth of the following month in which the water was injected. Many operators pay their accounts promptly upon receipt of invoices and are later reimbursed when the bonus oil is produced in the second succeeding month and the proceeds paid to the Salt Water company in the third succeeding month.

The growth of the Salt Water company has been rapid (Table 3). The daily average injection exceeded 50,000 bbl. per day in March 1943 and rapidly increased to above 100,000 bbl. per day by June 1943. The 200,000-bbl. daily average was reached in January 1944 and the 300,000-bbl. average in May 1946.

The Salt Water company started its operations during the war and consequently was considerably delayed by the critical shortage of necessary equipment, materials, and men. Although high priorities were extended to the company by War Production Board it was often months before pipe, engines, motors, pumps, and other equipment could be obtained. At no time during the life of the company has it been possible to obtain materials on a normal basis. The growth of the company under such circumstances has been remarkable.[7,8]

TABLE 3—SALT WATER INJECTED BY EAST TEXAS SALT-WATER-DISPOSAL COMPANY

Year—	Facilities furnished at year end			Water injected	
	Leases	Wells	Injection wells	Total	Daily avg.
1942, 3 months	27	208	9	588,607	6,398
1943	382	2,100	30	40,593,672	111,216
1944	454	2,372	34	79,279,702	216,611
1945	480	2,776	34	88,267,231	241,828
1946, 6 months	469	2,852	36	51,365,107	283,785



Salt water collection reservoir on the Shell-Bivens lease (Chism Survey). The main reservoir is a 7,500-bbl. gunite pit. Salt water flows by gravity from the surrounding leases through the asbestos cement pipe lines shown spilling into the oil skimmers (lower left-hand corner).

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2. Buckley, S. E., "The Pressure Production Relationship in the East Texas Field." A.P.I. Drilling and Production Practice. 1938.
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4. Payne, Bryan W., "Production and Disposal of Salt Water in the East Texas Oil Field." A.P.I. East Texas Chapter—May 1942.
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6. Jones, Ogden S., "Disposition of Oil-Field Brines." University of Kansas Publications, Lawrence, Kans., 1945.
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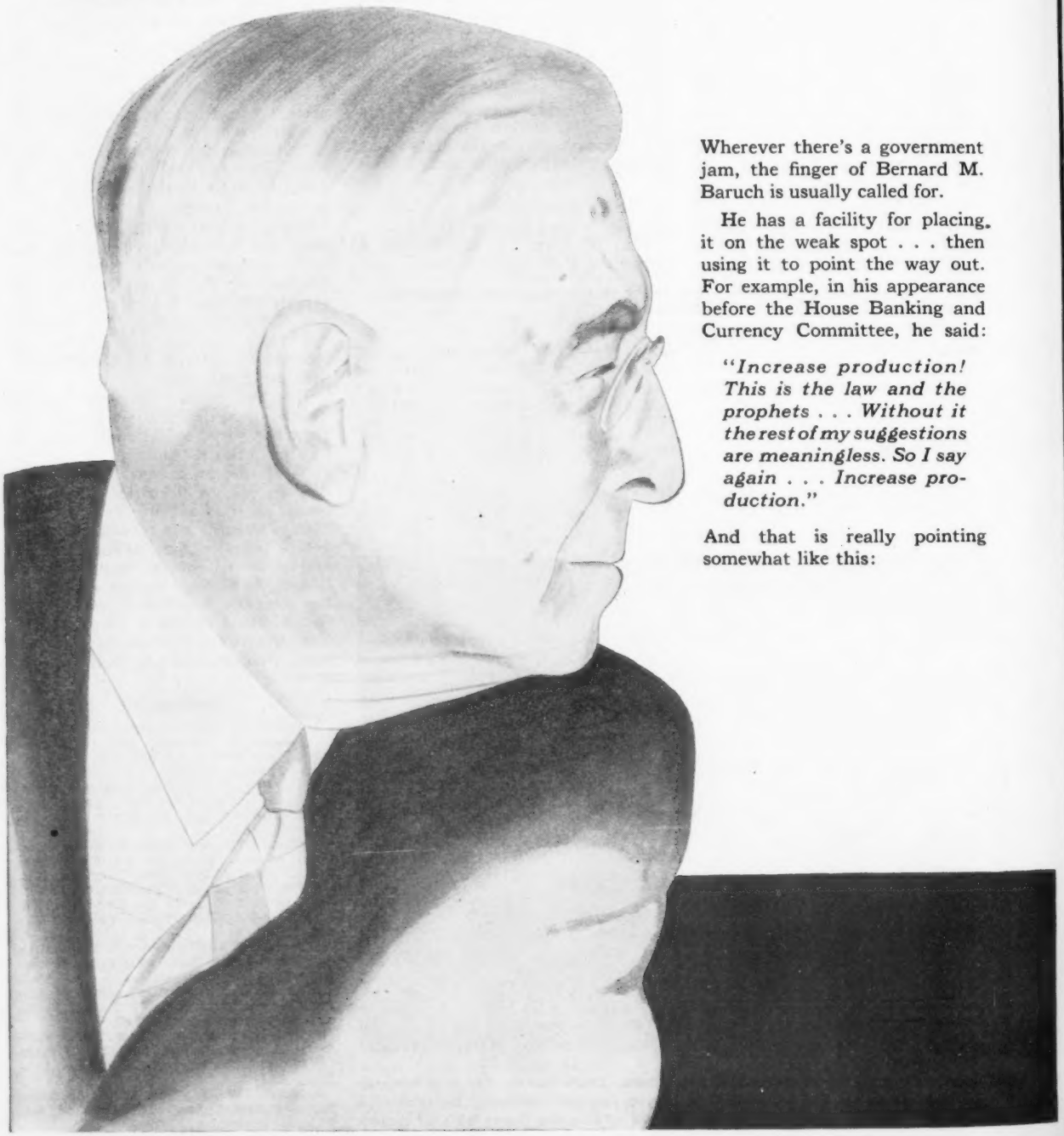
Then he said to himself:

"Quit stalling...start rolling!"



Wherever there's a government jam, the finger of Bernard M. Baruch is usually called for.

He has a facility for placing it on the weak spot . . . then using it to point the way out. For example, in his appearance before the House Banking and Currency Committee, he said:

> *"Increase production! This is the law and the prophets . . . Without it the rest of my suggestions are meaningless. So I say again . . . Increase production."*

And that is really pointing somewhat like this:

Reducing Mercury Losses in Flow Meter Operations

by John P. Squier

MAJORITY of mercury losses occur when an increased flow through a pipe line creates an over-range of the flow meter above the capacity of the orifice plate in use. Mercury losses are also created by: excessive backflow of the measured product, incorrect handling of meter manifold valves, obstruction of meter manifold valves and fittings due to freezing or accumulation of foreign matter, and sudden excessive leakage due to gasket failures or manifold ruptures.

Orifice flow meters are equipped with check valves for the purpose of preventing mercury losses, but these precise measuring instruments demand frequent periodic inspection for correct operation. Those who do not adhere to this procedure may find eventual check valve failure (by dirty gas, condensates, corrosion products, etc.) in addition to a general excessive depreciation of measuring equipment. Since the value of the mercury necessary for operation of a flow meter is approximately 15 per cent of the total cost of the instrument, continuous losses of mercury present a very definite economical problem in measurement operating costs.

Companies who are not guided by established maintenance methods or operators who may have single measuring installations in outlying areas that cannot be practically serviced at regular intervals can eliminate considerable losses of mercury by installation of automatic mercury return traps at the top of the mercury chambers in the instrument.

During a sudden over-range or under-range of the meter, the mercury is dispensed to the overhead trap, and after subsidation of the flow surge, the mercury automatically returns to the meter and resumes its normal function. The automatic return trap presents a definite improvement over the former style of mercury trap installed below the mercury chambers in the meter. The old style trap does serve the purpose of accumulating any mercury dispelled from the meter, however the instrument is rendered useless until the accumulated mercury can be manually removed from the trap and returned to the meter. This type of installation also collects manifold drainage due to condensation which necessitates reconditioning of the recovered mercury before it is returned to the meter for service.

Mercury Return Traps

Automatic mercury return traps can be easily constructed by operators of measuring equipment or purchased at nominal cost. Fig. 1 shows a dimensioned cross section of a very satisfactory return trap which can be used for working pressures as high as 2,000 psi. This equipment is constructed of extra heavy 2-in. pipe swaged to ¼-in., and threaded at the bottom to facilitate screwed connections at the top of the mercury chambers. The top inlet ¼-in. nipple is a closed-end, welded to the trap, and extends into the body of the trap approximately 4/5 of the internal diameter. Two 3/16-openings are drilled in the ¼-in. nipple approximately ½ in. from the closed end.

Various types of this general construction of return trap may be used. The principal precautions in construction are to avoid building a trap of too small a capacity to accommodate the volume of mercury in the meter, with allowance for turbulence in the trap, and a smooth streamlined interior which will allow the entire quantity of trapped mercury to drain into the meter after the excessive differential is reduced to the meter capacity.

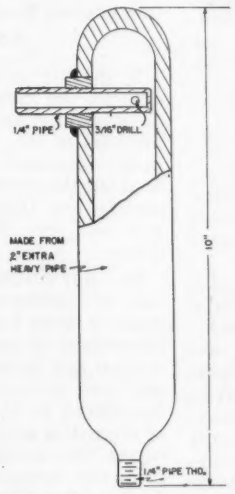
Assume an over-range of the meter is effected, and the meter check valve fails to function properly. The mercury is rapidly dispensed into the overhead trap where it forms a turbulent action until the excessive flow subsides. The entire amount of mercury then drains into the meter and correct measurement is resumed.

Possibly, if the over-range of flow is of considerable magnitude, a very small amount of mercury will be emitted through the 3/16-in. openings in the inlet nipple. This is due to an atomizing action of the mercury in the trap which is prevalent under extreme conditions of this nature. In this event, the meter will naturally be slightly off zero, but recording will continue and allowance can be made for the error created by analyzation of the differential recording on the chart. This is more practical from an economical and accuracy angle than obtaining no record whatsoever.

Fig. 2 indicates a diagram of automatic mercury return traps installed on a standard type orifice meter. It is shown that the installation of this equipment requires only an extension of the vertical manifold piping. A ¼-in. nipple, 24 in. in length, is recommended for extension of the original manifold piping.

When all or part of the mercury is dispelled from an orifice meter, the monetary loss is between 5 and 15 per cent of the original cost of the meter. When traps are not used, this mercury drains into the transporting pipe line and is usually not recovered. When old type mercury and liquid traps are used, in addition to long periods of unrecordation, considerable time is usually required to recondition the trapped mercury and return it to the meter.

There is also the possibility of a quantity of the mercury being lost in this operation due to careless handling. When a quantity of mercury is lost in the transmission line an automatic hazard is created, especially under high velocity and high pressure conditions. This element is often transported to the destination of the measured gas or liquid. Mercury has a definite crystalizing effect on brass or copper fittings, and failures of such fittings have been traceable to minute quantities of mercury entrained in the measured product.



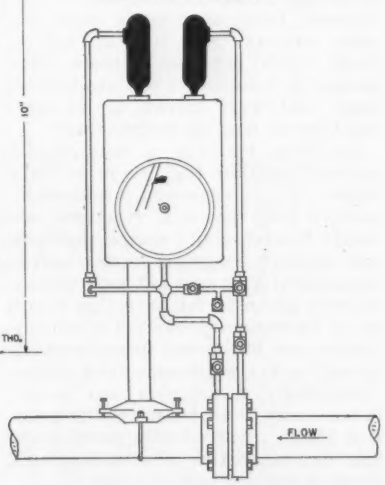


Fig. 1—(Left) Construction details of automatic mercury-return trap. Fig. 2—(Below) Installation of the automatic mercury-return traps at entrance to differential chambers of a meter

Fig. 1—Catalytic fuels may form carbon and soot deposits on ordinary pot-type burners. This is a cut-away view of a new modified burner

Combustion of Catalytically Cracked Distillates

. . . . and new burner design widening markets for these new fuels

by S. R. Cauley* and H. R. Linden†

ANALYSES of trends of oil-burner sales, distillate-fuel-oil demands for diesels and domestic burners, and refinery processing methods, made it apparent several years ago that practically all types of distillate-oil-burning equipment would eventually use some catalytically cracked fuel oil. In so far as domestic oil burners would be affected, this appeared to be of less concern in the case of mechanical types of burners than pot-type burners operating on natural draft. Such pot-type burners were primarily designed to use straightrun fuels, and were known to be quite sensitive to fuel-oil composition.

Realizing that use of catalytically cracked distillate fuel oils in pot-type burners would represent a radical departure from previous practices, and would involve major design problems and research programs for the burner manufacturer, it was felt that any assistance given in this direction would be of advantage to the petroleum industry and oil-burner manufacturers, as well as to the oil-consuming public. Accordingly, a program was undertaken to study all phases of the problem which involved fuel composition and characteristics, combustion, and possible burner modifications.

The studies of fuel composition consisted of finding some basic characteristics of distillate fuel oils which could easily be determined and used as a measure for comparing burning qualities of different oils. The result of this work was derivation of a simple method of estimating carbon-hydrogen ratios on the basis of gravity, aniline point, and distillation relationships (The Oil and Gas Journal, July 27, page 166). Examples of use of this tool in fuel composition and combustion studies have already been given.[1,2]

*Gasoline and fuel-oil department, Socony-Vacuum Oil Co., Inc. †Socony-Vacuum Laboratories.

Combustion Studies of Paraffins and Aromatics

It was fully appreciated at the beginning of the combustion studies that no generally accepted theory of the mechanism of combustion has yet been advanced. Furthermore, it is doubted that conclusive evidence supporting any theory of this phenomenon will be obtained in the near future.

The difficulties encountered in the use of catalytic fuels in pot-type burners were known to be excessive formations of carbon deposits on the bottom and sides of pot-type burners and soot accumulations. These were considered to be due to the presence of aromatics in catalytic fuel oils, and hence the combustion studies were primarily concerned with differences of characteristics of paraffins and aromatics, which seemed to be related to carbon formation or its absence under combustion conditions in a pot-type burner.

Fundamental studies of combustion of elementary fuels by Haslam and Russell[3] led to their conclusions that selective burning of either the hydrogen or the carbon of a hydrocarbon molecule does not occur. Considering the temperatures reached during combustion, the conclusion may be drawn that any soot (carbon) formed is the result of thermal decomposition or "cracking" and which was not subjected to such conditions, following its formation, as to affect its combustion. The possible importance of differences in cracking characteristics of paraffins and aromatics upon combustion was therefore suggested. This idea was further strengthened by Haslam and Russell's conclusion[4] that combustion was a "race between cracking and oxidation." The combustion studies were therefore divided into two phases, e.g., "cracking" and "oxidation." General summaries of reactions which were considered as being of possible significance are given below:

A—Cracking Reactions of Paraffins and Aromatics

The petroleum industry has made extensive studies of cracking reactions of pure hydrocarbons and general courses of reactions at atmospheric pressure are fairly well established.

In general, it may be said that the paraffins are primarily decomposed into hydrocarbons having lower molecular weights and hence more volatile. The condensation or formation of hydrocarbons of higher molecular weights and higher boiling points does not occur to any appreciable extent at atmospheric pressure except when the cracked products are subjected to additional cracking. The degree of cracking depends primarily upon time and temperature conditions to which the oil is subjected, and is affected by the presence of catalysts such as metals and certain types of radiation. Aromatics, in general, are much more resistant to cracking than the paraffins and differ appreciably in their reactions. If benzene and naphthalene may be taken as examples, then the two following sets of examples may indicate the approximate results when aromatics are

"moderately" cracked and "severely" cracked:[5]

"MODERATE" CRACKING

Compound and product—	Boiling point (°F.)
Benzene (b.p. 176.2° F.):	
Diphenyl	491.4
Diphenylbenzene	685.0
Triphenylene	....
Naphthalene (b.p. 424.4° F.):	
Dinaphthyl	680.0

"SEVERE" CRACKING

Benzene:	
Carbon	....
Hydrogen	....
Methane	—258.5
Acetylene	—118.5
Anthracene	670.1
Naphthalene:	
Carbon	....
Hydrogen	....
Methane	—258.5
Acetylene	—118.5
Benzene	176.2
Anthracene	670.1

It will be seen that when aromatics are moderately cracked, the cracked products have boiling points appreciably higher than those of the original materials. This has been explained as resulting from condensation or polymerization of intermediate products of cracking. Severe cracking of aromatics results in the formation of materials lighter and heavier than the original aromatic. According to some investigators[6] the breaking or cracking of a benzene ring results only in the formation of carbon and hydrogen. Catalysts and radiation also affect the degree of cracking of aromatics.[7]

B—Oxidation Reactions of Paraffins and Aromatics

The oxidation reactions of paraffins, indicated in the literature[8] have shown that paraffins are relatively easy to oxidize at moderate temperatures and that complete oxidation may be carried out without formation of free carbon.

Literature[9] on the oxidation of benzene has indicated that it is possible to progressively oxidize this aromatic to phenol, then to catechol or quinol and to their corresponding quinones. Further oxidation of the quinones is accompanied by formation of some unsaturated compounds of the type resulting from decomposition of paraffins and oxidation products of the same type as obtained upon oxidation of paraffins. In other words, after affecting oxidation of benzene to this point, the products have lost any identity as aromatics. This course of oxidation has been shown to be difficult without the aid of catalysts as the temperatures required were nearly those at which decomposition of benzene took place. However, this method of reaction was the only one found through which complete oxidation could be affected without formation of carbon.

Modification of a Pot-Type Burner

Considering the difficulties common to use of catalytic fuel in pot-type burners, in view of the above it was felt that they could be analyzed as follows:

Carbon deposits on bottom of burner.—Oil entering the burner tends to form a small pool on the bottom, and may be cracked by virtue of time and temperature conditions to which it is subjected prior to vaporization. Other influences would be direct absorption of radiation from the flame, and the fact that oil is in contact with the metal bottom which is known to be a cracking catalyst.

Paraffins, which tend to form more volatile components, upon cracking should give less carbon deposits by virtue of this characteristic.

Aromatics in the liquid which would be moderately cracked would tend to form condensation products having substantially higher boiling points than the original aromatics. The temperature required for vaporization would then be progressively increased, resulting in a magnification of this effect. The coke formation would result from additional cracking and condensation reactions.

Carbon deposits on sides of burner. Carbon deposits on the sides of a pot-type burner may be of two types. The carbon may be of a light fluffy type, or may be a hard granular type. The latter was felt to be due to re-cracking of a high boiling product which had been formed by moderate cracking of an aromatic in vapor

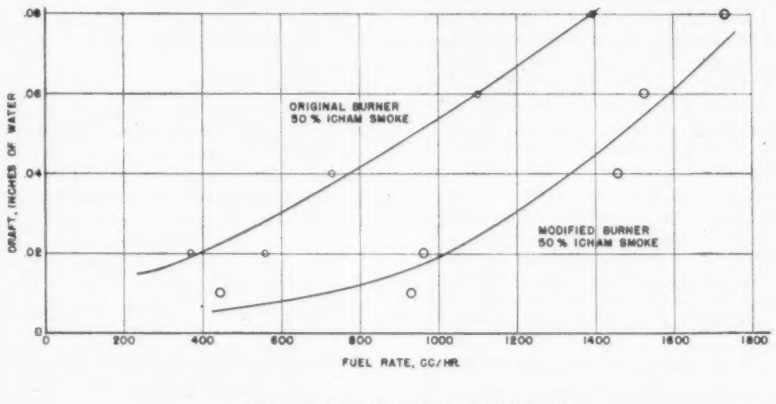


Fig. 3—Draft requirements of the modified burner as compared with the original

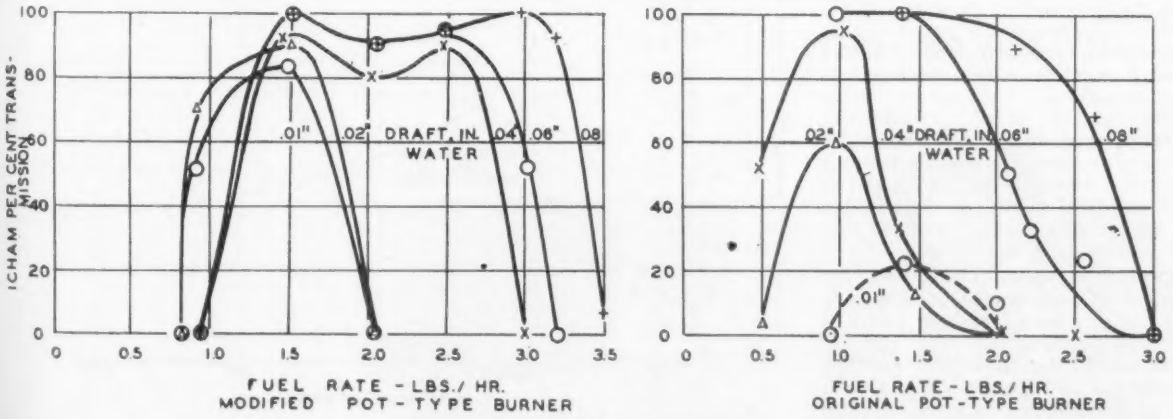

ICHAM PER CENT TRANSMISSION
.01" .02" DRAFT, IN. .04" .06" .08" WATER
FUEL RATE - LBS./ HR.
MODIFIED POT - TYPE BURNER
.02" .04" DRAFT, IN. .06" .08" WATER
.01"
FUEL RATE - LBS./ HR.
ORIGINAL POT-TYPE BURNER
FUEL USED : TCC DIST. FUEL OIL 25.9 °A.P.I.

Fig. 2—Comparison of performance of original and modified burners

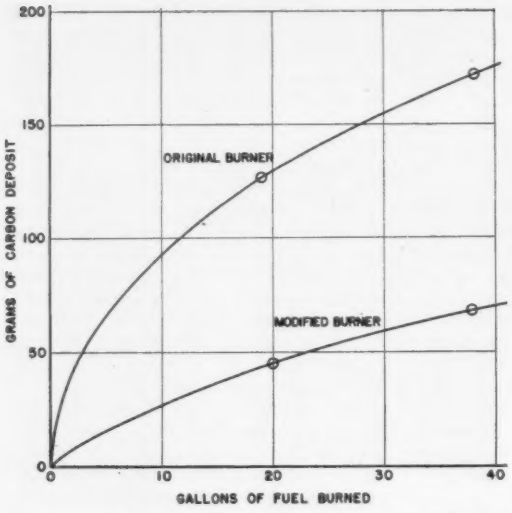


Fig. 4—Comparative rates of carbon accumulation

form (in the absence of air) and had condensed upon the sides. Soft carbon deposits would appear to be due to deposition of soot.

Soot formation.—Soot formation on the basis of previous studies was indicated to result from cracking or thermal decomposition of oil vapors to form carbon in the absence of sufficient air for complete combustion, and under such conditions of operation that some or all of the carbon was not subsequently burned. The mechanism of decomposition of aromatics suggested that this class of compounds was more susceptible to formation of carbon under "severe" cracking conditions, and that oxidation processes to prevent carbon production were more difficult to achieve as compared to those of paraffins.

The above emphasized the need for accomplishing the following in a burner modification:

1. Vaporization of fuel with as little cracking as possible.
2. Intimate mixing of primary air and oil vapors as soon as possible following vaporization.
3. Reduction of temperatures in the lower sections of the pot so as to attempt a progressive type of oxidation of aromatics with a minimum of soot formation.

Modification of a representative pot-type space heater rated at 50,000-B.t.u.-per-hour output was attempted with the above items as objectives, and the final modification is shown in Fig. 1. The changes evolved and the reasons for them follow:

Central oil inlet. — Side fuel entrances of conventional burners may have advantages, from the point of ease of cleaning or other reasons. However, in a conventional pot-type burner the oil vapors will take a path of least resistance and "rich" mixtures are obtained near the oil inlet, and "lean" mixtures prevail opposite the oil inlet. This militated against good mixing, and a central oil inlet was chosen for the burner modification.

The actual point of oil entrance was raised to obtain additional vaporizing surface to assist in more rapid vaporization of fuel, and was shaped as to facilitate oil removal away from the inlet, and thus minimize deposits which might interfere with oil flow.

The metal bottom was covered with a thin layer of refractory to minimize any catalytic cracking effect the metal might have. It was also believed that the insulating effect so provided might reduce some of the influences of sudden major changes in draft.

Radiation shield. — The radiation shield was installed to:

1. Prevent direct absorption of radiant energy from the flame by oil during vaporization;
2. Provide better mixing of oil vapors and air, and;
3. Effect a general reduction of temperatures in the lower part of the burner pot.

The mechanisms for the first two items are felt to be obvious, and need not be discussed. Lowering the temperature at the bottom by the shield was considered as having several effects. A lower temperature at this point, other things being equal, would mean that the flame would tend to be fixed at a greater distance from the bottom and thus give less possibility for cracking on the bottom. Furthermore, combustion studies pointed to the desirability of a progressive type of oxidation of aromatics, if such could be achieved, and suggested lower temperatures during mixing of air and oil vapors.

Central baffle.—The need for good mixing of oil vapors and air was obvious. However, with only 0.08 in. of water-pressure drop available for mixing, the method of accomplishing this to the necessary degree required considerable experimentation. The final modification involves use of a baffle which extends downward as shown in Fig. 1. The downward deflection of the baffle causes a higher velocity and better mixing than would be obtained if the baffle were placed horizontal or turned upwards.

Secondary air ducts.—Secondary air ducts were modified so as to bring more of the secondary air into the center of the pot. The general scheme of having alternate ducts shorter than the others, as incorporated into the original burner, was retained.

Performance Data

The heaviest catalytically cracked distillate fuel obtained from our normal refinery operations at the time of this project was selected as a test fuel. Inspections of this oil are given below:

Gravity, °A.P.I.	25.9
Distillation:	
I.b.p., °F.	435
10 per cent	488
20 per cent	501

(Continued on page 86)

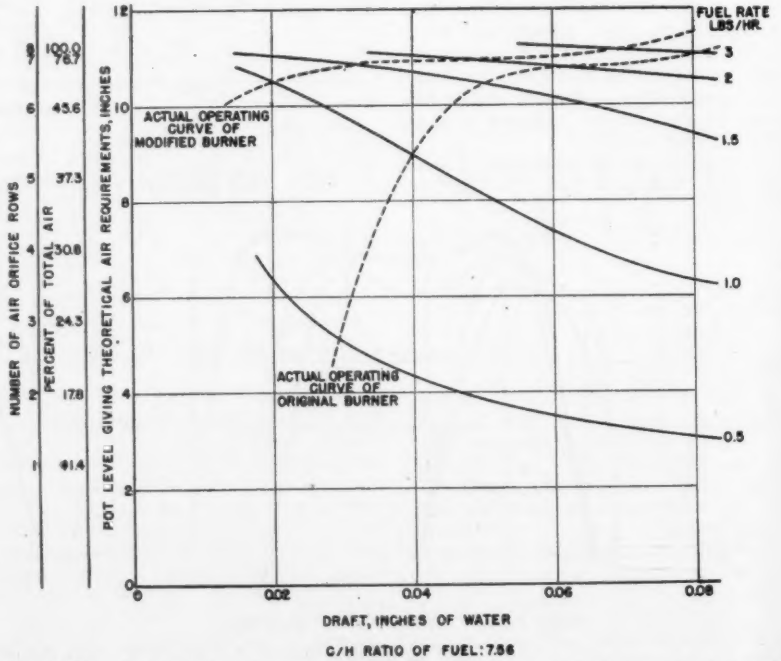
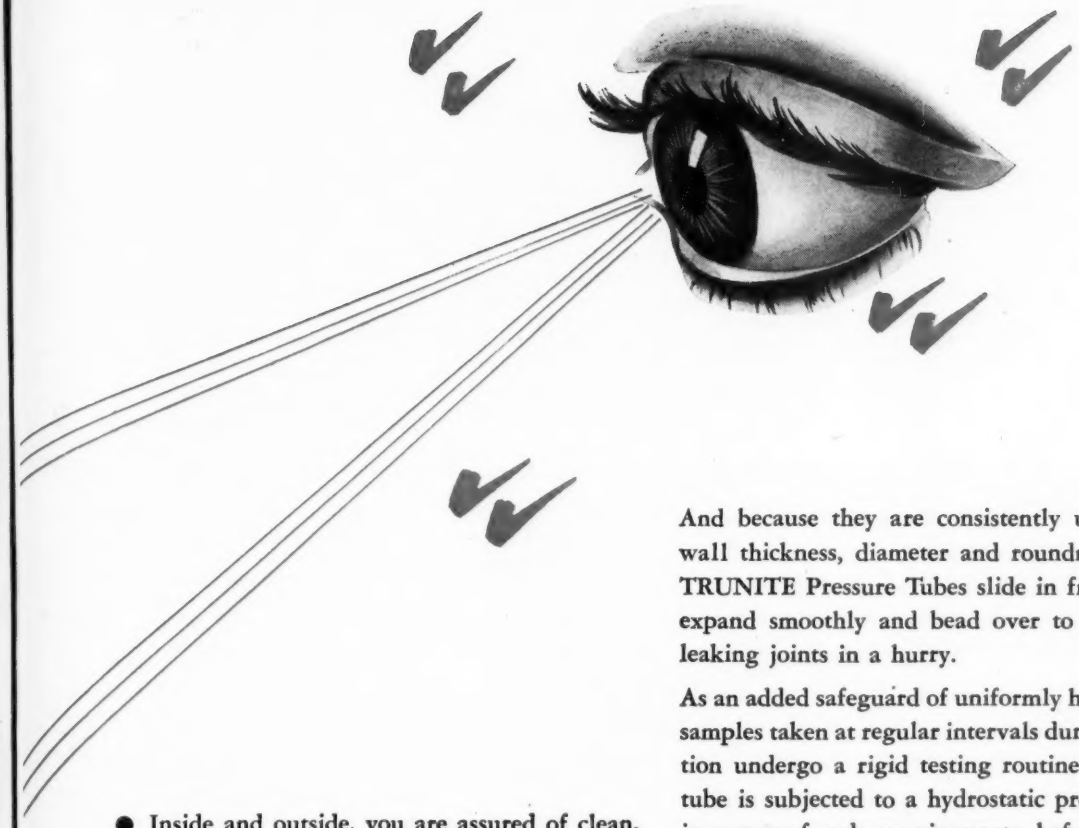


Fig. 5—Plot of air distribution study and operating draft curves found necessary for good burner performance



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Republic
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30 per cent	508
40 per cent	517
50 per cent	525
60 per cent	538
70 per cent	550
80 per cent	568
90 per cent	592
End point	636
Color	Dk. 1½
Flash point (PM), °F.	204
Pour point, °F.	Below 0
Vis. S.S.U. at 100 °F.	37
Aniline point, °F.	111.7
Con. carbon 10 per cent, res., per cent	0.11
Corrosion	O.K.
Sulfur, per cent	0.16
Diesel index	29
Approx. C/H ratio	7.56

Performance of a pot-type burner is usually measured in terms of smoke density under various conditions of operation, carbon deposits, and heat output. Smoke measurements are made by a method adopted by the Institute of Cooking and Heating Appliance Manufacturers (I.C.H.A.M.). This test consists of inserting a 5-mm. glass rod in the stack at a given point, and after 10 minutes the rod is turned through an angle of 180°. The rod is left in the new position for an additional 10 minutes. It is then withdrawn and inserted into a photoelectric cell which measures the per cent of light transmission through the glass rod. An I.C.H.A.M. value of zero denotes that no light was transmitted, and a value of 100 signifies complete light transmission. Rating tests on space heaters require that rated heat output be obtained at a draft of 0.08 in. of water, and that the I.C.H.A.M. smoke reading shall not be below a value of 8 at this point.

Comparative test data on the above fuel obtained in the original and modified burner are given in Table 1.

In these tests full rated capacity of the modified burner could be obtained, whereas such was not possible with the original burner.

A plot showing performance of the original and modified burners with reference to smoke characteristics at various drafts and fuel rates is shown in Fig. 2. The lines on the graphs represent points of constant draft. The improved performance of the modified burner in relation to cleanliness of combustion and less sensitivity to draft in the normal operating ranges is apparent from Fig. 2.

The lower draft requirements of the modified burner are shown in Fig. 3, which is a plot of minimum draft required at various oil burning rates to give a smoke reading of 50 I.C.H.A.M.

Burning tests are now in progress to determine the amount of carbon deposits that may be accumulated upon consumption of several barrels of oil and any deterioration in quality of performance occurring in this test. Due to exhaustion of the stock of original catalytically cracked distillate fuel oil, it has been necessary to initiate this test using a similar oil having a gravity of 28.5° A.P.I. The fuel rate is maintained at an average of 2.6 lb. per hour, draft is held at 0.07 in., and the operation is intermittent in that the burners are on for only 7 hours each day. At the present time over 40 gallons of fuel have been burned in both original and modified burners. A plot showing comparative rates of total carbon accumulations (bottom and sides) thus far is shown in Fig. 4. It will be noted that the carbon deposits for the modified burner are appreciably lower than those of the original burner. In addition, the modified burner operation has not yet deteriorated in its cleanliness of combustion, whereas the original burner has suffered in this respect.

Use of Catalytically Cracked Fuels

Performance of the modified pot-type burner, as described, has shown that it is possible to burn satisfactorily distillate fuel oils of a quality appreciably lower than that of No. 2 grades of fuel oil currently marketed. It may be noted in Fig. 2 that the present modification does not operate in the very low fire region with straight catalytic fuel oil. This is due to the tendency of the fire to burn under the radiation shield, which causes a smoky flame. However, a modification was effected which gave satisfactory operation under low fire conditions. On the basis of the results obtained, confidence is held that various burner manufacturers will be able to solve this minor problem in their burner units.

It is obvious that the results demonstrated in this article will be of value to all concerned only if they can be translated into new designs of vaporizing-type burners being sold to consumers. This means that considerable study and experimentation must be done by individual manufacturers of this type of burner to accomplish the desired result. An outline of a few points suggested in this study, which are believed to be related to a successful solution of the problem, should therefore be given.

Combustion Mechanism

The mechanism of combustion of fuels containing aromatics from pot-type burners upon the basis of experience is obviously quite different from that for combustion of straight-run fuel oils. Burner manufacturers have previously found that high temperatures in the bottom of a pot-type burner were conducive to good operation with straightrun fuels, whereas present studies have shown the reverse to be beneficial in combustion of aromatic fuels. A reorientation of ideas upon combustion in such burners is therefore indicated. It is not suggested that the possible combustion principles evolved in this paper represent what actually occurs. However, some substantiation is shown by the predominantly blue flame characteristics noted in the modified burner within fuel rates of 1.2 to 3.2 lb. per hour.

Air distribution and hole sizes within burners may also be subject to some additional study. Calculations made on an air distribution study are shown in Fig. 5, for the particular burner and fuel used. Also included in this plot are actual operating draft curves found necessary for good burner performance. It will be seen that all of the air available at 0.08 in. of draft is calculated to be theoretically required at a fuel rate of slightly more than 3.0 lb. per hour. This apparently accounts for the sharp break in smoke readings observed in Fig. 2 at fuel rates above 3.25 lb. per hour. In as much as it was necessary to have a fuel rate in the order of 3.4 lb. per hour to obtain rated capacity, and as catalytic fuels are more difficult to burn cleanly, some consideration should be given to an adequate supply of air. It is not expected that chimneys will become more efficient and higher drafts will be available. A maximum draft of no more than 0.08 in. will therefore prevail and provisions for adequate air supply should be taken into account in new burner designs. No attempt was made to modify primary air inlet holes in the burner modification undertaken, but it is felt that a properly balanced

(Continued on page 91)

TABLE 1—ORIGINAL BURNER

Fuel rate lb./hr.	Stack draft, in. of water	Smoke, per cent transm. (I.C.H.A.M.)	Per cent CO_2 (Orsat)	Stack temp., °F.	Eff. per cent (calc.)*
1.0	.04	95	5.2	390	75.5
1.5	.05	56	7.2	500	75.5
2.0	.06	60	8.9	605	75.0
2.5	.08	75	9.8	750	71.1
3.0	.08	0-8	11.9	870	71.7
MODIFIED BURNER					
1.0	.02	75	6.4	390	78.7
1.5	.03	100	8.6	530	77.1
2.0	.05	95	9.7	650	75.0
2.5	.06	95	11.3	760	74.5
3.0	.07	90	12.7	810	72.4
3.5	.08	6	14.0	970	72.2

*The above stack temperatures were measured under conditions which give higher readings than would be obtained under standard rating test procedures, and the calculated efficiency values are low. This is due to use of an insulated stack for safety reasons and convenience of thermocouple location

ment to which it had been baked. Tube-Kote, Inc., of Houston, which developed both the material and the method of application, began an exhaustive engineering investigation. It was found that the method employed in preparing the metal for the plastic coating spelled the difference between success and failure. As a result of this investigation Tube-Kote installed complete pickling facilities consisting of degreasing, rinse, acid etch, rinse, and neutralizing pH rinse tanks.

Further improvements included the installation of complete blast facilities for blasting the inside and outside of tubular goods, up to and including range three. The pickling tanks are 40 ft. in length and the sand blast room is 9 by 9 by 40 ft., and these additions permit the coating of tubing, line pipe, casing, valves, fittings, steel tank sections, and sucker rods on a production basis.

The thermosetting resin used to coat equipment contains suitable inert pigments, plasticizers, and solvents to give the maximum in flexibility and corrosion protection. It has a dielectric strength of approximately 2,000 volts. In coating the equipment at the Houston Tube-Kote plant a rack of pipe, for example, is lowered into the deep vat (Fig. 2) where it is coated inside and out. If inside protection only is desired, only the inside is blasted. The thickness of the coating on the threads is held to within thread tolerance. Several coats of plastic are baked on in the ovens (Fig. 3) at 300° F., and the final polymerization bake is made at 450° F. Ovens in this plant have recently been enlarged to handle 2,700 ft. of 2-in. tubing per hour.

A survey of the plastic-coated installations in a number of fields, or a discussion with the field men concerning equipment in wells, indicates that the plastic provides excellent protection against both corrosion and the deposition of paraffin. It is too early to predict the ultimate increase in the life of plastic-coated equipment as compared with uncoated equipment. However, in many cases the plastic-coated material has been in operation for months without showing signs of corrosion; whereas the uncoated equipment previously used under the same operating conditions showed severe evidence of corrosion after only a few weeks in operation. In other cases of plastic-coated material operation, where visual inspection is not possible without dismantling of equipment, the iron content of the water in contact with the plastic coated equipment has been decreased to practically zero. For example, a 4,200-ft. 4-in. string of plastic-coated tubing was installed in an East Texas salt-water-disposal well 8 months ago. Periodic tests of the salt water show that the previously high iron content of the water has been reduced to a negligible quantity.

In the Penwell field in West Texas 3,650 ft. of 2½-in. tubing and the same amount of sucker rods were installed in a well by a major oil company in April 1945. The rods and tubing were pulled June 1, after 14 months of operation. Neither rods or tubing showed evidence of corrosion. New, uncoated rods and tubing installed in this well prior to the plastic-coated installation showed severe corrosion at the end of a 2½-month operating period.

Many companies on the Gulf Coast have installed plastic-coated flow lines as a means of eliminating the maintenance expense connected with the periodic removal of paraffin. In practically all cases where such in-

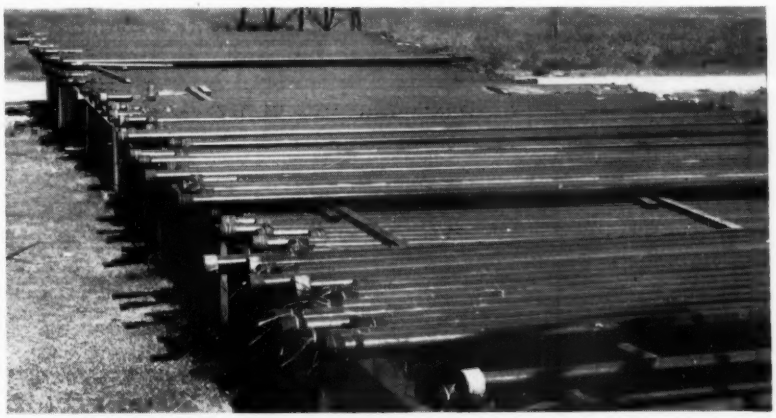

Fig. 5—(Above) 4,000 ft. of plastic-coated 4-in. pipe for use in flow string of sulfur wells

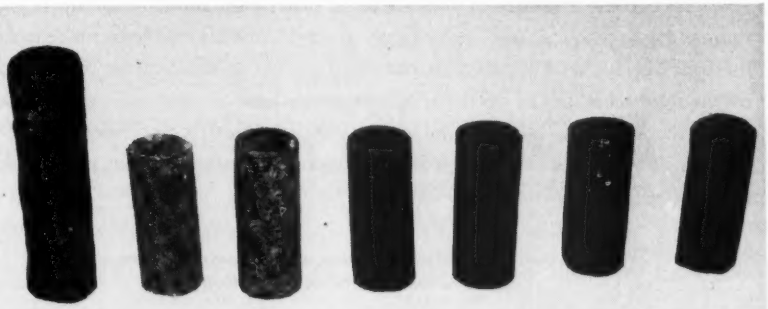

Fig. 4—(Below) Plastic-coated fittings for salt water disposal system

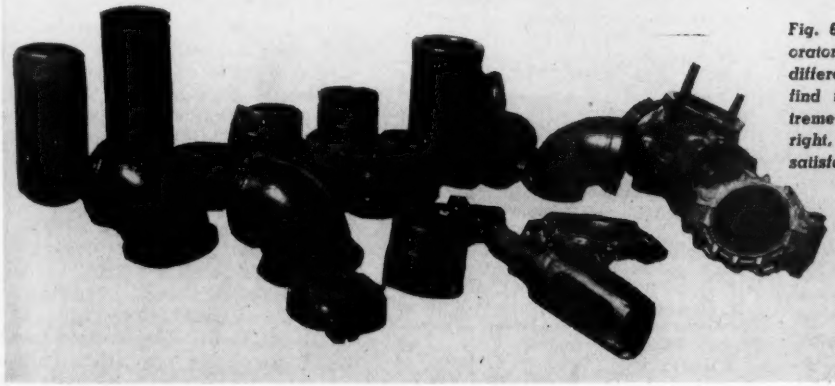

Fig. 6—(Above) Results of accelerated laboratory tests made by sulfur company. Seven different special coatings were tested to find the type which would withstand extreme corrosive conditions. The sample at right, or seventh attempt, passed the test satisfactorily

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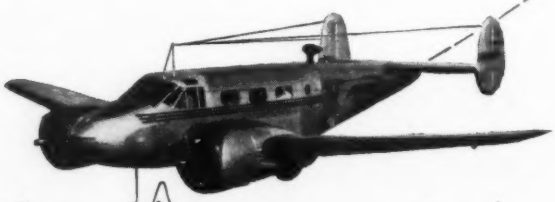

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stallations have been made, operators have conducted tests to determine the effectiveness of the smooth plastic coating to prevent the deposition of paraffin.

A typical test of this kind was recently conducted by an operator in southern Louisiana. Six joints of plastic-coated pipe were alternately spaced with regular pipe in an under water flow line. This test, made during the cold winter months when paraffin deposition is usually the greatest, was conducted over a period of 5 months. At the end of this time the test portion of the line was inspected. The plastic-coated joints were found to be completely free of paraffin. The adjacent joints of regular pipe were coated with a layer of paraffin which had decreased the inside diameter by 1 in.

In connection with the prevention of paraffin deposit in tubing, a Southern Louisiana operator eliminated the necessity for scraping paraffin by equipping all wells with plastic-coated tubing. These tests were conducted over a period of 18 months.

South Texas Installation

The satisfactory performance of plastic-coated equipment in highly corrosive field areas is perhaps responsible for its recent entrance into a number of chemical plants. One plastic-coated installation which has been in operation for a sufficient period of time to permit comparison is located in a South Texas styrene plant. The coated fittings and pipes are subjected to aluminum chloride at elevated temperatures. Unprotected equipment in this service had a life of approximately 2 weeks. The plastic-coated fittings and pipe have now been in service 9 months, with no failures to date.

At this time a sulfur company near Houston reports that as a result of accelerated laboratory tests of plastic-coated equipment, field installations have now been made. The equipment, however, has not been in service long enough to establish the life of the plastic-coated equipment as compared with regular uncoated equipment.

Other tests of plastic-coated materials are in progress on the Gulf Coast which promise interesting possibilities. Two oil companies and also two drilling contractors have installed several joints of plastic-coated drill pipe in drill strings to determine the ability of plastic to prevent corrosion fatigue. These tests have not been in operation long enough for definite conclusions, although none of the coated joints have failed due to internal corrosion. One joint in one of the test strings failed because of an external crack. Inside inspection of this joint revealed the plastic coating to be intact.

Catalytically Cracked Distillates

(Continued from page 86)

unit providing larger volumes of air would have made the modification somewhat simpler.

Control of temperatures in the bottom of the pot for clean operation was found to be somewhat critical. The thickness of refractory on the bottom of the radiation shield influenced the results obtained. Refractory coatings thicker than the one found satisfactory apparently caused pooling of oil on the bottom, thus providing longer residence time; excessive cracking, and a smokier flame. Refractory coatings that were too thin allowed higher temperatures which brought the flames down lower into the pot, and also adversely affected smoke readings.

Control of mixing of air and oil vapors was also shown to be quite important. In the modified burner it was found that approximately 24 per cent of the total air should be mixed with oil vapors below the baffle, and that increased turbulence in flow of the mixture was necessary for proper mixing.

Conclusion

1. A modification of a pot-type burner has been effected which has been shown to operate satisfactorily with a highly cracked catalytic distillate fuel oil over a major portion of the oil burning rates normally employed in such equipment, and found to give full rated capacity of the burner.

2. The method of modification indicates that with some reorientation of ideas and experimentation on the part of pot-type burner manufacturers, they may be able to modify their equipment so as to handle less expensive grades of fuel oil than those currently required.

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Compact Group Gathering Data on Brine Disposal

OKLAHOMA CITY.—The research and coordinating committee of the Interstate Oil Compact Commission is now assembling data on the mechanics and statistics phases of brine disposal operations of all the oil producing states.

This work is preparatory to the quarterly session of the compact at Grand Rapids, Mich., August 8. At the present time questionnaires are being circulated to agencies in each state that are responsible for the control of oil field brine disposal, asking:

1. What are considered the most satisfactory methods for brine disposal.

2. Fields in which all produced brines are adequately and satisfactorily handled (field name, total producing wells, barrels brine handled per day).

3. List of total number of producing wells in state, total number of wells producing brine with oil and gas, amount of brine disposed of per day.

4. Problems relating to the disposal of oil field brines (engineering and technical, legal, administrative and miscellaneous.

The committee also is considering adoption by all member states of a uniform pressure base for the measuring and reporting of gas. Primary purpose is to place gas figures from the different producing states on the same basis, thus permitting consolidation of the figures by areas and as a total for the nation.

Texas A. & M. to Hold Instrument Short Course

COLLEGE STATION, Tex.—The Agricultural and Mechanical College of Texas will offer its first short course on "Instrumentation for the Process Industries" September 4-6.

The course will be conducted as a seminar with lectures and discussions on the subject of automatic control. Cooperating will be many industrial concerns manufacturing oil, gas, and chemical products. Manufacturers of instruments and automatic controls, likewise, will take part by arranging educational exhibits and providing capable lecturers for many of the sessions.

The program will cover a wide variety of subjects of value to instrument, process design, and operating engineers, including measurement and control of temperature, pressure and liquid level, and time control.

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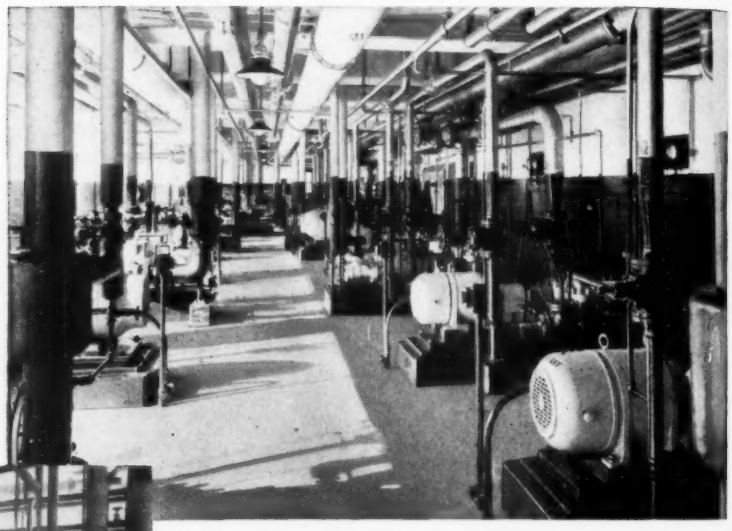
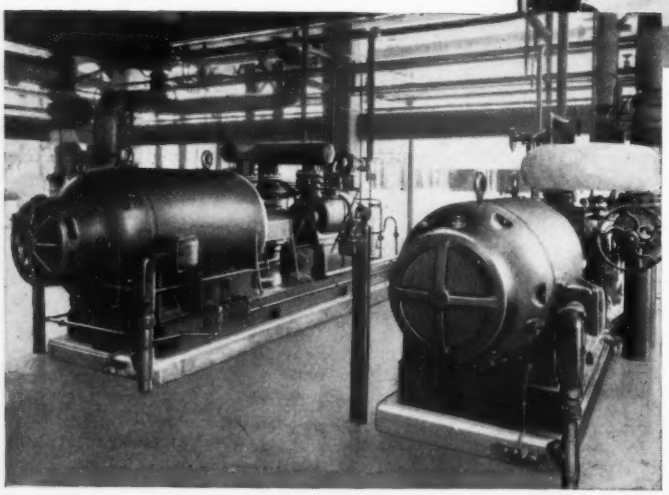


Main pump room in a refinery. The pumps are driven by G-E totally enclosed, fan-cooled, squirrel-cage induction motors ranging in size from 25 hp to 250 hp, 3000 rpm.



Tutwiler Refinery of the Cities Service Oil Company at Lake Charles, La.—Two large, totally enclosed, fan-cooled, explosion-proof, squirrel-cage induction motors, each coupled to a centrifugal pump. The motor at the left is a 600-hp, 3600-rpm Type K, and the one at the right is a 500-hp, 3600-rpm Type K-6339Z.

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DRILLING IN CALIFORNIA'S WEST NEWPORT FIELD

. . . independent operators complete 74 wells at 2,000 ft. to produce 5,800 bbl. per day.

THE West Newport Field is located between the cities of Huntington Beach and Newport Beach, in the western portion of Orange County. Areal limits of production are not as yet definitely established as the field is still being developed; however, it is quite certain that its limits will embrace portions of Sections 17, 18, 19 and 20, 6s-10w and Section 13-6s-10w, S. B. B. & M.

Attempts to develop an oil field here have been going on since 1904, with more than 25 operators at one time or another having drilled some 53 wells. The geology is so complex, however, that it was not until the D. W. Elliot discovery on the Banning lease in 1943 that a successful and commercial field was developed.

Well Data and Completion Methods

The field produces about 5,800 bbl. per day from 74 wells, all save two in the "B" zone. On the east side of the Santa Ana River, the average daily production from 46 wells is 3,990 bbl. per day or 86.7 bbl. per day per well; while on the west side the average is 28.4 bbl. per day per well. Macoil Co.'s "Banning" 2 and 301 produce approximately 90 bbl. per day from the "C" zone. The gravity of the oil on the west side of the river, including the "Atha area," runs from 17.5° to 23.8° A.P.I., while that of the "B" zone on the east side averages 15.9° to 16.3° A.P.I.

The casing program consists of a small amount of 13⅜ or 11¾-in. surface pipe, with either the 7 or 8⅝-in. water string cemented above the "B" zone. The 5½ or 6⅝-in. liner is then run through the "B" zone and in most cases float packed with gravel.

Average completion time for wells on the east side of the river is 5½ days, while that on the west side will vary from 14 to 20 days. The wells are shallower on the east side, ranging from 1,500 ft. at the top of the gentle northwesterly dipping nose, to 2,050 ft. along the east edge of the Santa Ana River. On the west side the depth range is from 2,300 to 3,100 ft. The range of costs to completion on the west side run from $27,500 to $35,000 while on the east side the average is about $17,000.

There is approximately 490 acres of proven "B" zone area at the present writing, about 30 acres of which occurs in Blocks A and B, 160 acres adjacent to the west side of the Santa Ana River and 300 acres on the east side. Another 125 acres is indicated as probable, southeast of Block B.

Many cores were taken in the "A" and "B" zones throughout the field, and analyses have been made as to porosity, permeability, interstitial wa-

*Consulting engineers and geologists, Los Angeles, Calif.

CORE ANALYSIS RESULTS—WEST NEWPORT FIELD

Zones—	Porosity (%)	Permeability (md.)	Residual sat. Oil	Residual sat. Water*	Residual water salinity (Gr/G)	Oil-water ratio	Gas-oil ratio	Formation factor	Est. bbl./acre-foot recovery, primary	Sand thickness (ft.)†	Proven acres est.	Bbl. per acre recovery est.
East side:												
"A"	36.82	1,433	31.63	54.70	580	0.577	110	1.51	523	80	125	41,800
"B"	32.81	1,284	60.22	29.14	561	2.70	181	1.19	522	120	300	62,640
West side:												
"A"	....	....	....	....	....	....	....	....	....	....	....	.....
"B"	32.81	1,284	60.22	29.14	561	2.70	200	1.71	478	25	157	11,850

*Residual water saturation includes drilling fluid plus approximately 15 per cent connate. †From core records and electric logs.

Note: As of May 1, 1946, the cumulative production on the west side of the field is approximately 259,269 bbl.; and on the east side, 408,502 bbl.; or a total for the field of 667,771 bbl.

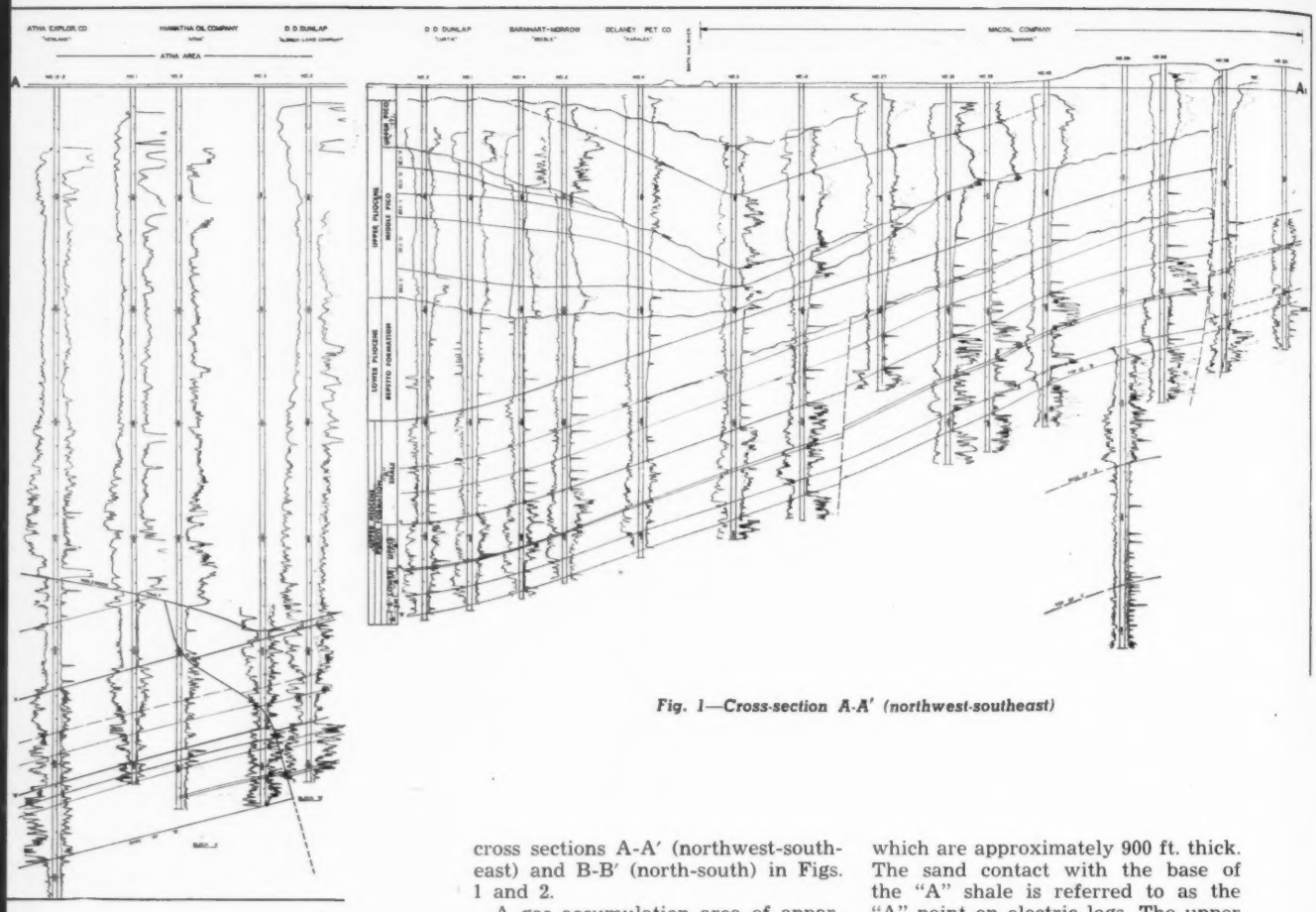


Fig. 1—Cross-section A-A′ (northwest-southeast)

ter content, oil and water ratio, productivity index, etc. (see accompanying table).

East of the river, the average producible oil sand in the "B" zone will approximate 120 ft., with an estimated recovery of 522 bbl. per acre-foot or 62,640 bbl. per acre. The "A" zone contains an average of 80 ft. of effective sand with an estimated recovery of 523 bbl. per acre-foot or 41,800 bbl. per acre. Adjacent to the west side of the river only 25 ft. of effective oil sand is present in the "B" zone with an estimated 478 bbl. per acre-foot or 11,850 bbl. per acre. Commercial "A" zone production is not present in this area.

As the data on the "C" zone and the "Atha area" is rather limited, reasonable forecasts of recovery are unpredictable at this time.

Geology

The West Newport oil field underlies the westerly portion of the Newport Mesa and the adjoining flats of the Santa Ana River flood plain. It is the most southerly of a chain of fields along the Inglewood-Newport fault system. The geologic column, in descending order, is shown in the cross sections A-A′ (northwest-southeast) and B-B′ (north-south) in Figs. 1 and 2.

A gas accumulation area of apparently limited extent is found in Bed "E" of the Middle Pico formation in the high which occurs in the north central portion of the southeast quarter of 18-6s-10w. Accumulation closure is believed to be effected by a combination of faulting and low permeability. Barnhart-Morrow Consolidated 1 Meyer had a gas blowout from this zone while drilling, and blew an estimated 10,000,000 cu. ft. daily for three days before the hole sloughed in and killed the flow.

Bed "E" is the basal portion of the Middle Pico and dips south-southeastwardly unconformably on the upturned edges of the north-northwesterly dipping Repetto shales. Such a condition suggests that the gas may have been introduced into Bed "E" through contact with the organic Repetto formation.

The Puente formation (Miocene) underlying the Repetto carries oil. The upper portion is normally 400 to 500 ft. thick and is composed of brown shale and silicified siltstone shells with occasional lenses of grey silt and silty oil sand. In the Atha area, thickness varies from 40 to 300 ft., the differential being the result of the wells crossing the Inglewood Fault.

This bed is locally referred to as the "A" shale and is underlain by the Lower Ashton series of sands which are approximately 900 ft. thick. The sand contact with the base of the "A" shale is referred to as the "A" point on electric logs. The upper "A" zone is approximately 185 ft. thick and contains commercial production above the —1,900 ft. contour. It may also contain some oil in the upstructure portion of the Atha area. The aggregate sand contained in the zone approximates 75 per cent.

The "A_1" shale separates the upper "A" zone from the lower "A" zone. The thickness is approximately 18 ft. on the highest structural location and feathers out to a few feet in the Atha area.

The lower "A" zone is about 135 ft. thick and contains an aggregate of 70 per cent of well to poorly sorted oil sand and grey sand, east of the Santa Ana River, while in the "Atha area" the thickness is about 160 ft. with 40 per cent oil sand. Areal limits of production are apparently not very widespread.

The "B" shale underlies the lower "A" zone and is about 70 ft. thick. It is mainly brown shale with a few thin streaks of sand and "shells" and serves as the cap for the underlying "B" zone.

The "B" zone is the principal producing zone of the field. Penetration varies from 25 ft. on the —2,300-ft. contour to 230 ft. on the —1,100-ft. contour. In Fault Block "A" the penetration range is from 35 to 295 ft. Aggregate sand in the zone amounts to

about 75 per cent of the interval open to production. Typically, it is medium to coarse, well sorted, quartzitic, somewhat micaceous, readily friable, and dark brown in color.

Macoil Co. 3 Banning was drilled to 7,010 ft. as a test of deep horizons and encountered the "A" and "B" zones with normal saturation intervals. Accordingly, casing was cemented to provide protection for the zones.

A third zone, locally known as the "C" zone, was found by this test, the top of which is located approximately 1,000 ft. below the "B" point. The upper 500 ft. of the formation is designated as the "B" sand or the lower half of the Lower Ashton series, while the lower 500 ft. is composed of indurated, banded grey and brown laminated shale. The underlying "C" zone is 350 ft. thick, with a sand aggregate of 30 per cent of the interval. The sand is characteristically micaceous, fine silty, soft, friable and of a dark brown color. "Banning" No. 2 and No. 301 are the only wells producing from the zone. No. 301 is a recent completion, having been placed on production June 12, 1946, for an initial yield of 78 bbl. per day of 13.8° crude, cutting 10 per cent. The 8⅝-in. waterstring was cemented at 2,290 ft. with 326 ft. of 6⅝-in. liner landed at 2,576 ft. including prepacked perforations from 2,300 ft. to 2,576 ft.

Formations penetrated in "Banning" No. 3 below the "C" zone, will not be discussed for the present.

Structure

Structure controlling oil accumulation in the West Newport field, is a northwesterly plunging nose truncated transverse to the strike by fracture planes of the Inglewood fault system. The main Inglewood fault is of the normal type, upthrown on the north and downthrown on the south and dipping southwestward, as demonstrated by Section B-B′ It has been mapped, commencing from a point in the middle of the NE¼, Sec. 29-6s-10w, striking approximately northwest to a point near the W¼ corner of Section 18-6s-10w, where it is apparently bisected by a northerly trending fault which produces a lateral displacement of 600 to 800 ft. Across the offset, the fault continues on the same northwesterly bearing and obviously controls accumulation in the "Atha area" and probably connects with the fault system effecting southerly closure of the Old Field at Huntington Beach. The segment resulting from truncation of the Inglewood fault by the northerly trending fault, is in turn divided by a complementary fault striking north 25° west producing a horst (Block A) and a graben (Block B). Closure in Block A is approximately 200 ft. while that in Block B is 130 ft. Displacement south of Block A is estimated to be 1,700 to 2,000 ft., while about 1,200 ft. is noted between Signal Petroleum Co. 1 Callens and Standard Oil Co. 1-A "Pacific Ranch."

Eastern closure of the field is effected by a normal fault zone striking north 10° east through the middle of the east half of Section 20-6s-10w, with its southerly terminus at the main Inglewood fault. Macoil Co.'s 58 and 59 "Banning" and Elliot and Classens 1 "Ikeda" were cut off by this fault. It is upthrown on the east and downthrown on the west, with some evidence of increasing vertical displacement northward. "Banning" 58 was subsequently whipstocked 70 ft. west and completed as a 190-bbl.-per-day producer.

Another fault of the normal type, trending north 25° west, is indicated bisecting the intersecting corners of Sections 17, 18, 19 and 20. This fault is shown at the northern terminus of cross section B-B′ and between Macoil Co.'s No. 13 and No. 27 on cross section A-A′. Vertical displacement is about 15 or 20 ft., with the east side positive and the west negative.

Considerable data has been assembled on the Inglewood fault as a result of development of the area. This is of prime interest because of the active status of the fault and its connection with seismic disturbances in the Los Angeles Basin. In the vicinity of the Santa Ana River, vertical displacement is approximately 300 ft. while 1½ miles northwesterly, a probable 2,000 ft. is indicated.

Sand Characteristics and Their Relation to Production

The sands of the producing zones of the Lower Ashton series are typically fine to coarse in texture, predominantly rounded, well sorted, and rather loosely consolidated. The pore spaces are well intercommunicating as evidenced by the high permeability average of 1,284 md. Porosity values are also excellent, the average being slightly over 30 per cent.

The unconsolidated nature of the oil sands plus the high viscosity of the oil, act as a handicap to production where sand control methods are not employed. In this connection, the most common practice of sand control is afforded by the use of either prepack or float pack gravel liners. A few wells have tried conventional liners but they have not proved to be satisfactory.

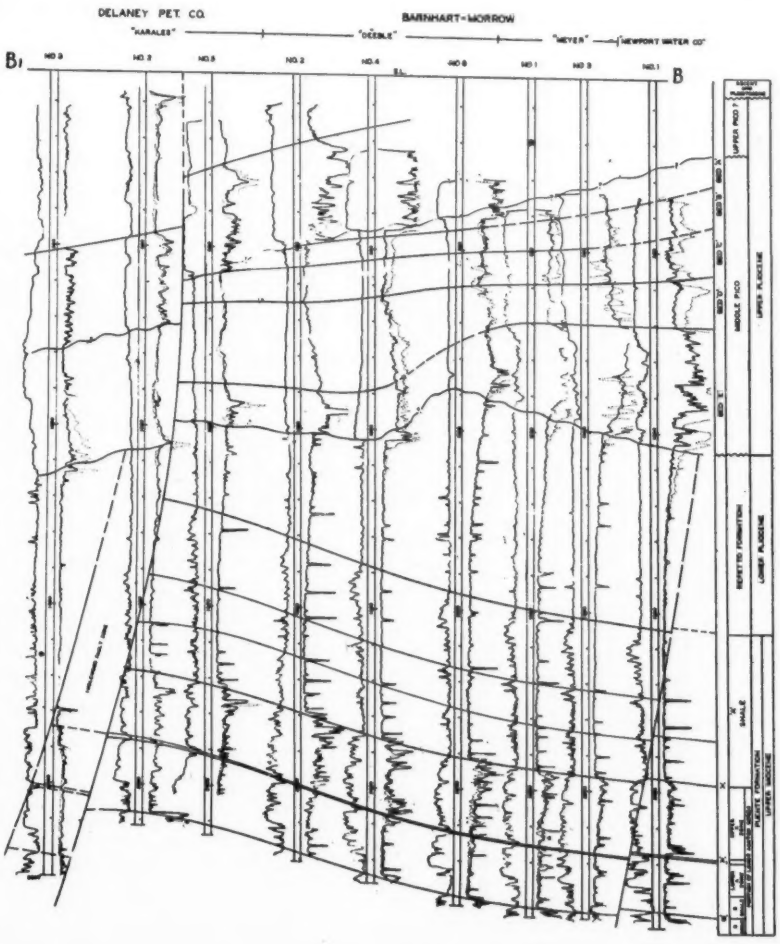


Fig. 2—Cross-section B-B′ (north-south)

PART 12 IN A SERIES

HEAT-CONSERVATION methods and equipment have become inherent in modern refining processing. Exchangers are employed between heater coil and evaporator or between evaporator and fractionator, where maximum heat differentials exist. Transfer line exchangers have a theoretical advantage in which they may reduce the amounts of vapor which must be handled by the units into which the transfer line discharges, reducing the size of these units. Sometimes a heat-carrying medium such as the molten nitrate-nitrite salts in the Houdry exchange system is used to carry away and utilize heat which otherwise may be wasted.

The Fluid catalytic cracking process uses two principal heat recovery means, catalyst heat exchangers on the regenerator and the absorption of heat from the catalyst by the incoming feed. Thermofor cracking routine absorbs much heat generated in the process in heating boiler water, at the rate of 5-7 lb. of steam per lb. of carbon burned from the catalyst.

Waste Heat Recovery in Refinery Process Equipment

by George Armistead, Jr.

MOST of the basic steps in the refining of petroleum require the addition of large quantities of heat for such purposes as distillation and the maintenance of necessary temperatures for reaction. Since there is comparatively small consumption of heat as endothermic heat of reaction in most processing steps, the major part of the heat addition required must also be suitably dissipated. The use of heat-exchange equipment for returning to the process system or otherwise reusing the heat which must be dissipated from process steps has been a natural development, along with the evolution of the refining art during the past 20 years. Thus, in processes rejecting heat at temperatures above those of incoming feed, exchange between such incoming feed and the heat rejection stream is usually justified since it reduces the net heat dissipation by the system and consequently total heat-transfer surface and fuel requirements are reduced.

The resultant reduction in heat-transfer surface is usually that of fired heaters, which surface may be several times as expensive as that of ordinary exchange equipment. For the foregoing basic reasons, waste-heat-recovery equipment has become an inherent part of modern process design, employing a wide variety of methods and equipment. In many cases other steps in the processing, or the equipment required by them, are vitally affected by heat-recovery methods. It is the purpose of this article to discuss qualitatively various methods in common use for the recovery of waste heat in various types of modern processing.

Waste-heat-recovery systems may generally be classified as follows:

1. Those in which the heat recovered is returned directly to the process system from which it would otherwise be rejected.

2. Those wherein heat being rejected from one process system is utilized to fill the requirements of some other system, including the generation of steam.

The detailed design of heat addition and dissipation equipment on a processing unit including the furnaces, exchangers, condensers, and coolers, is a highly specialized problem in any instance. It is, however, governed by certain general principles based on the fundamental heat-flow equation:

$$\frac{Q}{\theta} = UA\Delta T$$

When:

- Q = Quantity of heat, B.t.u.
- θ = Time, hours.
- U = Over-all coefficient of heat transfer, B.t.u./Hr./Sq. Ft./°F. temperature difference.
- ΔT = Mean temperature difference between hot and cold materials, °F.

Thus in heat-recovery systems, the following factors are favorable to high recovery rates per unit of equipment.

1. Those which favor high temperature differential. In many waste-heat-recovery systems, the object is not alone total B.t.u. transfer, but the attainment of a certain final temperature on the recovery medium. In complex systems recovering heat from a variety of streams of different quantities and temperatures, therefore, it is required that the proper sequence of steps be followed with due regard to the temperature difference and relative quantities.

2. Those which permit high over-all heat-transfer coefficients of the fluids involved to be realized. This depends upon the character of materials and mechanisms involved in any given exchange, with boiling liquids, condensing vapors and high velocity liquid tending to give the better individual transfer rates, although the over-all rate in a given transfer operation is to a large extent dependent upon the poorest coefficient involved.

Thus from the standpoint of heat recovery, a main requirement is to balance available quantities of heat and temperature differences properly throughout the various subdivisions of the system in order to get maximum heat transfer or to permit maximum economy in the recovery equipment. Some systems are fortunately very adaptable to this requirement while others are in the opposite direction. The following discussion of various types of heat recovery systems in use throughout the industry is mainly restricted to high temperature processing where such recovery is most important to the industry, although it is of importance also in subatmospheric temperature processes where similar problems exist.

The crude-distillation unit, operating independently, is a relatively

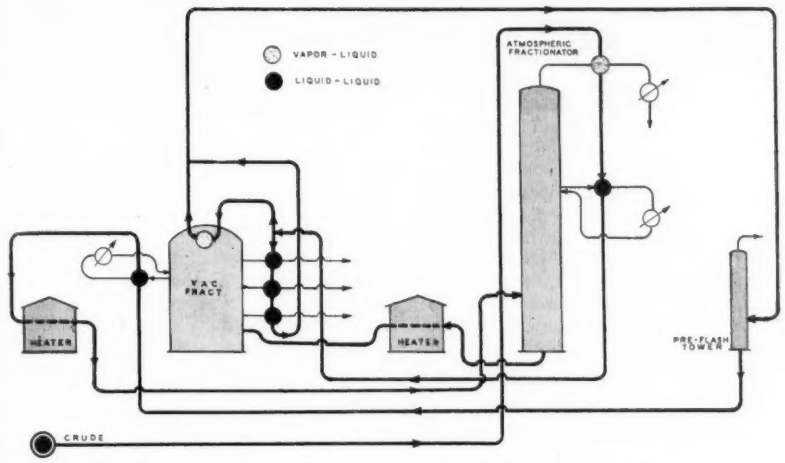


Fig. 12-1—Heat recovery on multistage crude-distillation unit

simple problem in heat recovery. Fig. 12-1 illustrates diagrammatically a multistage crude system employing the generally accepted maximum in the way of heat recovery. In common with all such systems, the first heating of cold crude is done by exchange against gasoline vapors, and while transfer coefficients in such equipment are relatively high, they are limited by the low temperature of the gasoline which rarely exceeds 250° F. Subsequent heating of crude is effected by exchange with side-stream cuts on the fractionators including the vacuum tower, the crude passing through exchangers against progessively higher-temperature oil. It will be noted that the crude stream is split through the side-cut production exchangers and the overhead exchanger for the purpose of balancing heat quantities and temperature differences. Such side-stream cuts and vacuum tower overhead condensers do not represent all of the high temperature heat dissipation from the system, and as shown in Fig. 12-1, the crude after preflashing is further heated by exchange with a high-temperature reflux stream drawn as an intermediate cut from the vacuum tower.

In order to achieve the required flashing temperature, a system such as shown requires fired furnaces, since the required temperatures are usually above 600° F. and the amount of heat available at or above this level by exchange is usually quite limited in a crude system. Feasibility of recovery of heat from residuum in crude systems depends to a large extent on the per cent of residuum made, which in turn determines the available heat, and with vacuum flashing systems running to 8-15 per cent residuum may be impractical despite the high temperature of the residuum.

Combination Crude and Cracking

Fig. 12-2 covering a combination crude and cracking unit, represents the application of heat recovery that has been the basis for a large amount of construction during the past 15 years. Thermal-cracking units, particularly those with integral viscosity breaking, light-oil cracking, and naphtha reforming, operate at a relatively low crack per pass over-all, in the range of 10-20 per cent, and thus have large amounts of waste heat to dissipate. Since the maximum temperatures employed in such units are 900°-1,050° F., that is, some 200°-300° higher than ordinary crude-unit temperatures, it is readily possible to effect distillation of crude up through a considerable portion of the gas oil range by heat exchange, although fired heaters may also be required if extensive vaporization, say 70 per cent, is required.

In the system shown in Fig. 12-2, the crude is split into two parallels, first acquiring heat from the gasoline vapors, then from the reflux streams for the two evaporators. Next the crude is passed through a fired heater for the additional necessary heat requirement for vaporization of gas oil. A basic feature of heat recovery on thermal cracking and similar systems is to effect a large part of the heat withdrawal on high temperature vessels through a reflux condensate intermediate of the fractionators, as in the two evaporators shown, which will be available at a temperature approaching that of vapors entering the vessel, at which maximum the greatest heat is available for transfer.

The amount of refluxing done by this method primarily for the purpose of facilitating heat exchange is limited generally by the overhead reflux requirements for proper fractionation. As shown in Fig. 12-2, such reflux streams after heating crude may be used for stabilizer reboiling and the like. An equivalent of this heat extraction by reflux that has also been widely employed, is the use of heat exchange between the highest-temperature available vapors and the

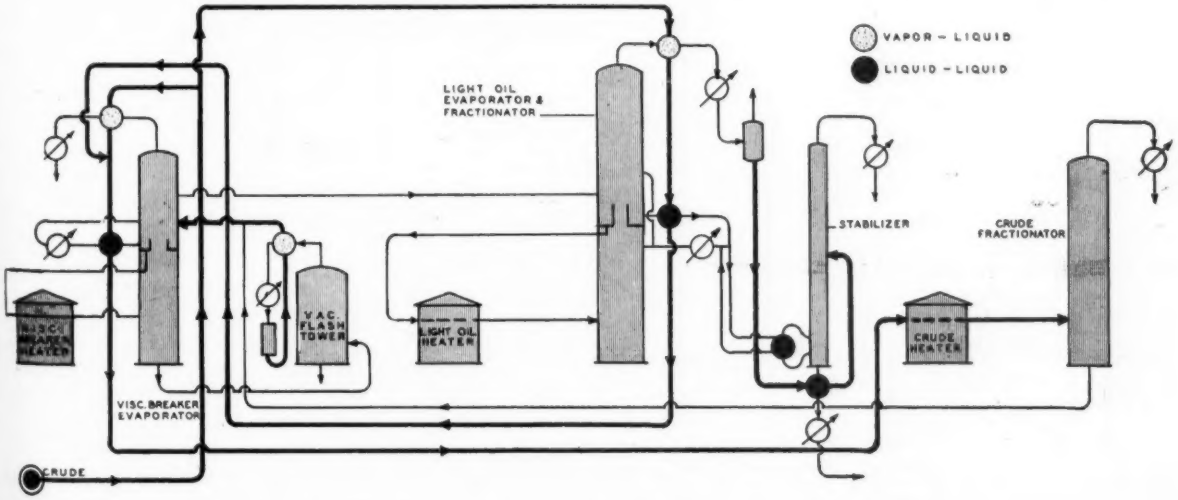


Fig. 12-2—Heat recovery on combination crude and cracking unit

crude, thus giving theoretically greater heat availability.

Such exchangers are employed, for example, between evaporator and bubble tower on cracking circuits where the vapors are at 700°-750° F. There is a difficulty with tendency of the exchanger surface to foul on the vapor side, when it is attempted to maintain maximum differential, due to carryover of tar from the evaporator, thus eliminating the theoretical advantage of the system and in some cases being less effective and far more troublesome. As shown in the figure also, vacuum tower overhead after condensation is reheated with its own vapor before introduction into the fractionating system, and much of the heat thus recovered becomes available for exchange at a somewhat higher temperature in the fractionator intermediate reflux exchange system.

Where cracking units are operated independently of crude distillation, additional heat dissipation must be effected since the cold cracking feed is usually much less compared to the available heat from the cracking unit. In such instances, it is sometimes profitable to employ the fractionator reflux for steam generation.

One adaptation of heat transfer on thermal cracking and related units such as thermal polymerization and hydroformers has been the transfer-line exchanger whereby the effluent from the cracking or polymerization coil or reactor system is exchanged with feed to the same system or with other low-temperature materials. Such exchangers, sometimes operating at pressures up to 2,000 lb., must be of special construction, and for such purposes versions of shell-and-tube and double-pipe exchangers have been used successfully.

In the transfer-line exchanger, phase relations must be within the proper limits to avoid deposition and building up of coke which applies mainly on thermal cracking units, and has been one of the main factors opposed to the use of transfer-line exchangers on such equipment. Actually, the transfer-line heat exchanger has a considerable theoretical process advantage in thermal cracking and other processes, in that it may decrease the volume of vapors to be handled in the system into which the transfer line discharges, thus reducing the size of such equipment.

The recovery of waste heat by the generation of steam has been covered in considerable detail by Kraft et al[1] who outlined applications to several types of thermal processing units including crude distillation, combination cracking, and polyform equipment. Included in the technique described therein was the recovery of heat from furnace flue gases by the use of steam generating surface in the effluent gases from the oil processing zone of the furnace.

Catalytic-Cracking Units

The comparatively recent advent of catalytic cracking units has opened up an entire new field of applications on heat recovery. This has arisen from the fact that such units operate at a conversion per pass far higher than thermal cracking units and usually at somewhat lower temperatures and further that they are usually operated independent of crude running facilities and do not have whole crude as a heat dissipation medium.

While these factors tend toward relatively low heat dissipation, and low capacity to absorb such waste heat, an important offsetting factor is the fact that such units produce and burn a substantial amount of coke as a part of the operation. The heat-recovery problem on the catalytic cracking unit is therefore similar to that of independent thermal cracking units, with certain very specific requirements for removal of the coke-burning heat at its point of generation so that catalyst temperatures do not exceed certain established maximum temperatures (generally 900°-1,150°).

The catalytic cracking systems are different from those previously described, however, in that heat available in the combustion gases at the permissible level may be discarded without the usual investment for coolers, condensers, etc., since the gases themselves are discharged to the atmosphere. The recovery of the heat in them therefore, is justified only by its worth in the form of steam or otherwise.

Fig. 12-3 illustrates the heat-recovery system employed in the Houdry catalytic cracking process. As is well known, the deposition of coke occurs on the catalyst in the cases and each case is alternately employed on reaction and for burning off the coke. The heat absorbing medium employed

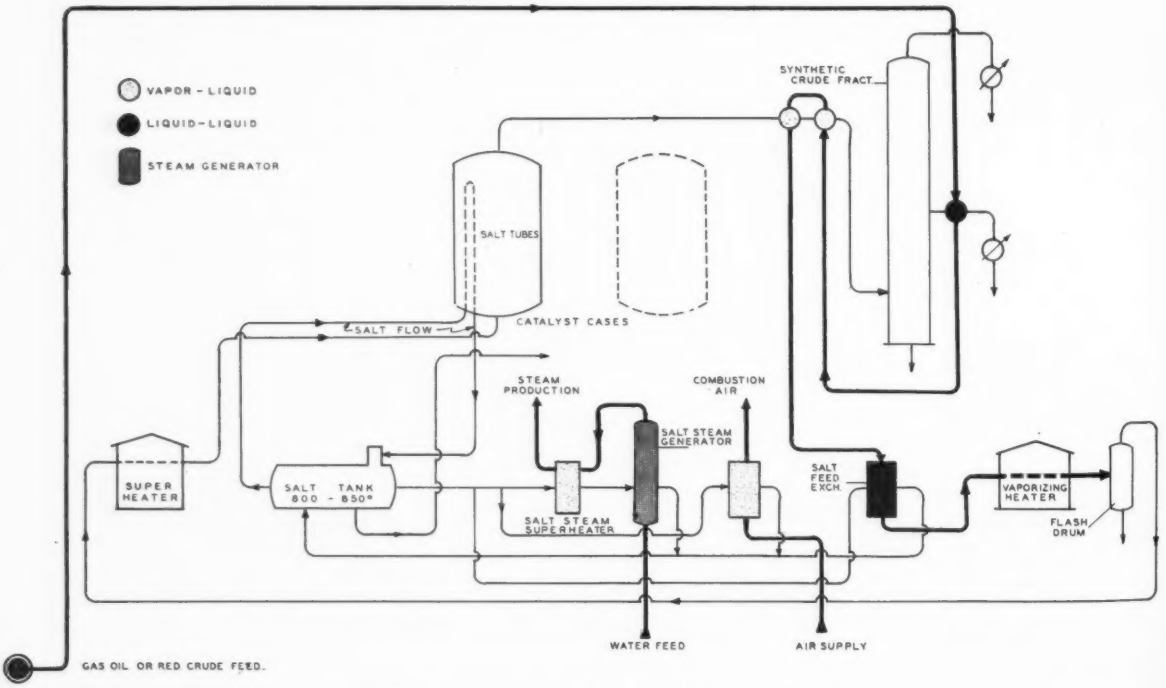


Fig. 12-3—Heat recovery on Houdry catalytic cracking unit

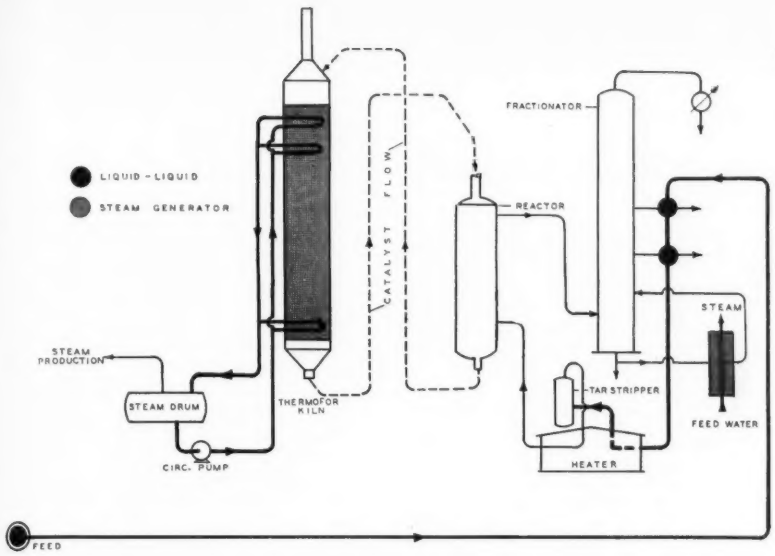


Fig. 12-4—Heat recovery in Thermofor catalytic cracking process

in the catalyst cases is a molten nitrate-nitrite salt mixture at temperatures of 800°-900° F. Such salt is circulated through finned heat-transfer surface in the cases during burning cycle and returned to the salt tank from which it can be circulated to furnish endothermic heat of reaction to the cases then on process.

The remaining heat dissipation from the salt system is effected by its circulation through exchange equipment steam generation and superheating in which steam for the plant mains is generated, and for preheating air used for burning carbon in the cases, which latter amount of heat is therefore returned to the system. In addition, the circulating salt may also be employed for heating of feed, as is indicated in Fig. 12-3.

A further extraction of energy for the combustion gases in the Houdry process is by means of the combustion gas turbine which supplies power to the blower furnishing air to the cases for combustion. In addition to this means of removing the heat liberated by the carbon burning and returning part of it to the process system and part to the burning cycle, more or less conventional heat recovery is employed on the hydrocarbon products from the fractionator, and intercondensers similar to those discussed have been employed on vapors from the cases with satisfactory results.

The Fluid catalytic cracking process illustrated in Fig. 12-5 likewise has the same problem of dissipation of heat arising from the burning of process carbon. The problem is somewhat reduced in this process by a higher permissible temperature in the carbon-burning zone than on the Houdry process, permitting a greater heat rejection in flue gases from the regenerator proper. Two principal heat-recovery means are employed, namely, catalyst heat exchangers on the regenerator and the absorption of heat by the feed introduced with catalyst from the entrance to the reactor.

Carbon in this process is burned at low pressure at a comparatively high temperature, 1,050°-1,100° F., and consequently waste-heat boilers are generally justifiable on the regenerator effluent vapors. The transfer surface of such boilers is usually of special construction to avoid plugging with catalyst. The most frequent type is the vertical fire-tube design tilted appreciably off the vertical so as to provide wetting of all tube sheet surface. As to the Houdry process, heat exchange of incoming feed is also effected with fractionator condensate streams, and excess heat available in this portion of the system is used for steam generation. The most profitable source of heat for such steam generation is the catalyst slurry condensate from the fractionator base.

Fig. 12-4 illustrates the Thermofor catalytic cracking heat-recovery system which employs still a different method. In this process the heat from combustion of carbon is removed from the burning zone through exchange in a large amount of tube surface therein through which boiler water is circulated. The heat transfer is effected by catalyst flowing vertically down over the horizontal water tubes, which in some cases may be finned and other cases bare. The production of steam is in the neighborhood of 5-7 lb. per pound of carbon burned. Thus the T.C.C. kiln or burning zone effects the same order of heat removal as is effected in the Houdry case salt circulation and the Fluid catalyst cooler waste-heat boiler.

The heat-exchange equipment employed in the services discussed in the foregoing varies widely in design, and in many cases is usable only for the specific duty intended. In several of the services, the basic heat-transfer data had to be carefully worked out in the course of process development, because of its effect on the actual process results.

Reference

1. W. W. Kraft, Valentine Mekler and R. H. Riemenschneider, "Generation of Steam as a Factor in Modern-Refinery Heat Economy," Refiner and Natural Gasoline Manufacturer, June 1941, p. 83.

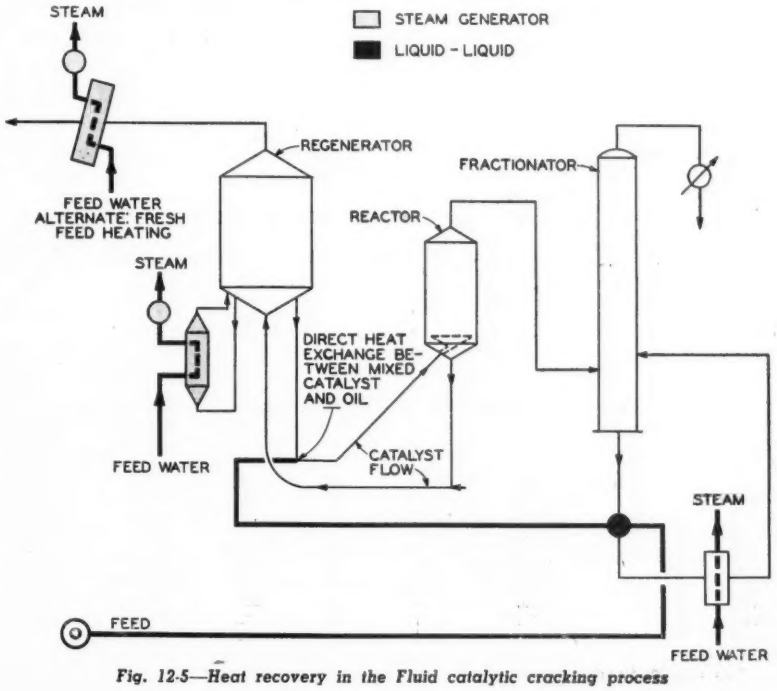


Fig. 12-5—Heat recovery in the Fluid catalytic cracking process

PROGRESS IN METALS

by W. L. Nelson
Consulting Engineer

Aluminum and Magnesium Alloy Prices

DISCUSSION of the application of aluminum and magnesium alloys is rife and yet few executives or engineers know the real cost of these materials. The prices listed here will assist in putting these discussions on a realistic basis. The prices were taken from the April 1946 issue of Modern Metals and caution should be employed in using them. The prices are considered average, and individual quotations will vary according to tonnages and special requirements. A thorough understanding of weight/volume/strength characteristics is essential; otherwise new users are cautioned not to figure product costs from these prices. For example, copper extrusions at 20.87 cents per pound are more expensive than aluminum extrusions at 26.00 cents per pound, due to the weight/volume ratio. Modern Metals of Chicago will answer questions regarding relative values, costs, materials, availability, etc.

Nomenclature

Certain of the aluminum alloys shown in the price table are designated by means of numbers and letters to indicate the kind, composition, or heat treatment of the alloy.

Casting alloys.—Only a number to indicate composition (none shown).

Wrought alloys.—Indicated by an "S" after the number, e.g. 17S means an alloy of 17 composition and it has been wrought. Had the letter "A" been used before the number, as A17S, it would indicate a minor modification in the composition of the 17 alloy.

Annealed condition.—Designated by using an "O" with the "S," e.g. 52SO is an alloy of 52 composition which has been wrought and annealed leaving it in a "soft" condition.

Hardened condition.—Hardening is indicated by the letter "H" after the letter "S." Varying degrees of hardening are indicated as "¼H," "½H" and "H." Thus, the alloy 2S½H is a No. 2 wrought alloy half hardened.

Solution heat treatment.—The first step in heat treating is to bring all of the components into solution by heating. If the alloy is left in this intermediate state it is marked by a "W," as 61SW.

Heat treated alloys. — Designated by the letter "T." Thus 17ST indicates an alloy of 17 composition which has been wrought and then hardened by heat treatment and aging. A number following the "T" as in 11ST3 indicates the type or kind of heat treatment, i.e. heat treatment No. 3. The heat treatments consist almost exclusively of precipitation hardening or aging. Finally the heat treated alloys may be strain-hardened and this is designated by an "R," as 24SRT.

TABLE 1—AVERAGE LIGHT METAL PRICES

Aluminum	
Primary ingot	15.00c lb.
No. 12 smelter ingot	10.50c lb.
No. 108 smelter ingot	11.00c lb.
No. 95-5 smelter ingot	14.00c lb.
Deoxidizer	8.5 to 10.00c lb.
Sheet (alloys 2S and 3S, flat, carload)	23.25c lb.
9 gage, 12″ x 48″	27.90c lb.
17-18 gage, 26″ x 48″	31.70c lb.
21-22 gage, 24″ x 42″	21.20c lb.
.25″ plate alloy, 2S, 3S	24.20c lb.
.25″ plate alloy, 24S	22.80c lb.
.25″ plate alloy, 61S	
Extrusions	
Normal temper (ton base) 2S, 3S	25.50c lb.
Normal temper (ton base) 24S	34.00c lb.
Normal temper (ton base) 61S	28.50c lb.
Tubing	
2″ by .065″—2S½H	40.00c lb.
2″ x .065″—52SO	61.00c lb.
2″ x .065″—24S	67.50c lb.
Screw machine stock (base price)	
¼″ rounds, 17ST, 11ST3	29.50c lb.
2″ hexagonal, 17ST, 11ST3	26.00c lb.
Magnesium	
Primary pure ingot	20.50c lb.
Primary alloy ingot	23.00c lb.
Grade A smelter ingot	14.00c lb.
Sheet—.25″ down to .032″, flat, will vary between	48.00 and 90.00c lb.
Tubing—Between 3″ x .25″ and .50″ x .12″, price will vary between	57.00 and 95.00c lb.
Bar and rod (2″)	42.50 to 46.00c lb.
Bar and rod (½″ or less)	48.00 to 58.00c lb.
Extruded shapes (sold in form factor) i.e.	
Forms 1 to 4	47.50c lb. nominal
Forms 23 to 25	55.50c lb. nominal

TABLE 2—COMPOSITION OF SOME ALUMINUM ALLOYS, PER CENT

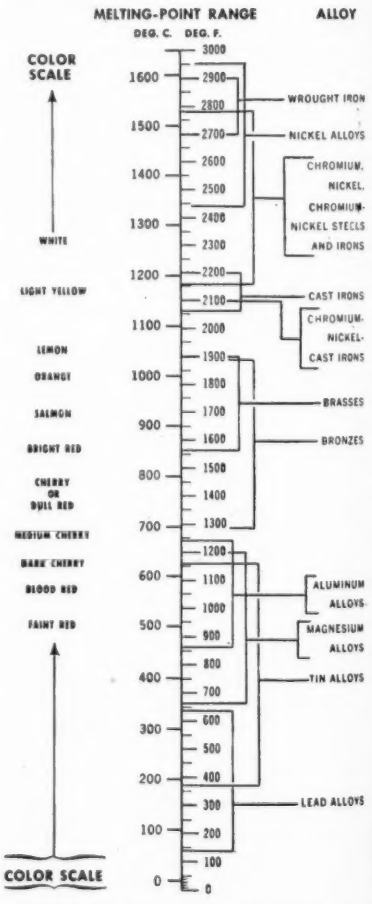
Alloy	Aluminum (min.)	Manganese	Magnesium	Chromium	Copper (max.)	Silicon
2S	99	.....	.....	.....	.....	.....
3S	97	1.0-1.5	.....	.....	0.2	.....
61S	98	.....	0.8 -1.2	0.35 max.	.....	0.4-0.8
52S	96	.....	2.2 -2.8	0.15-0.35	0.07	.....
17S	92	0.4-1.0	0.2 -0.75	.....	3.5-4.5	.....
24S	92	0.3-0.9	1.25-1.75	.....	3.6-4.7	.....

TABLE 3—PROPERTIES OF SOME WROUGHT ALLOYS

Alloy	Ult. TS psi.	Yield strength psi.	Elongation % in 2″	Brinell hardness 500 kg.-10mm.	Shearing strength psi.	Fatigue strength psi.
2S½H	17,000	14,000	*9	32	11,000	7,000
3SO	16,000	6,000	30	28	11,000	7,000
3SH	29,000	25,000	4	55	16,000	10,000
52SO	29,000	14,000	25	45	18,000	17,000
61SO	18,000	8,000	22	30	12,500	8,000
61SW	35,000	21,000	22	65	24,000	12,500
61ST	45,000	39,000	12	95	30,000	12,500
17ST	62,000	40,000	20	100	36,000	15,000
24ST	68,000	45,000	20	105	41,000	18,000
24SRT	70,000	55,000	13	116	42,000	.....

*On 1/16-in. sheet.

Melting Range and Color Scale of Alloys



Courtesy Linde Air Products Co.

Helium Used by Bureau of Mines to Trace Travel of Injection Gas

INCREASED use of natural gas during recent years for recycling and pressure maintenance purposes has emphasized the importance of a tracer gas such as helium in providing much-needed information on reservoir conditions. R. A. Cattell, chief of the petroleum and natural gas division of the U. S. Bureau of Mines, first conceived the idea of employing helium as a tracer. Selection was on the basis of this gas being chemically inert and not losing its identity.

Lack of a rapid and accurate method for determining helium content in natural gases, on the other hand, originally was thought to be a possible deterring factor in the development of a tracer process using helium. However, a sensitive apparatus capable of quickly and precisely detecting helium in natural gas was developed by E. M. Frost, Jr., chemical engineer at the bureau's Amarillo, Tex., helium plant, and has been given a series of tests in the Elk Hills field, Naval Petroleum Reserve No. 1, in Kern County, Calif.

Prior to the injection of helium into the 43,000-acre Elk Hills field, natural gas from the producing wells first was checked carefully for helium content, the new portable analysis equipment expediting this portion of the work. By observation of time required for helium to travel from the injection well to adjacent output wells and by determining the concentration of helium in the producing wells, reservoir conditions could be charted with reasonable accuracy between wells.

Principal features of the Elk Hills helium injection tests, from U. S. Bureau of Mines R. I. 3897, "Helium Tracer Studies in the Elk Hills, Calif., Field," by E. M. Frost, Jr., and which has just been issued, are given hereinafter.

Test Apparatus

The tests of the helium content of the natural gas were made with the new portable helium-analysis apparatus[1] which is capable of detecting contents lower than 0.001 per cent. In the portion of the Elk Hills field studied, the preliminary survey showed the natural gas from the producing wells to contain an average of about 0.0007 per cent helium.

The gas injection well (No. 85) in Section 33-S was selected for the helium tracer test. Approximately 2,000,000 cu. ft. of gas per day was injected at a pressure of 200 psi. into the Sub-Scalez 1 at 2,760-2,805 ft., and into the Sub-Scalez 2 zone at 2,825-2,860 ft. These sand sections are 20 to 35 ft. and 20 ft. thick, respectively. Porosity of each is about 35 per cent, permeability averages 2,000 to 3,000 md., connate water content about 20 per cent.

The Bureau of Mines brought the helium to the field in motor transport trailers, and throttled it from 2,400 psi. directly into the injection well. The first helium addition to the injection stream was May 25-July 7, 1945, and was made at a rate so as to bring the helium content of the injected gas to approximately 0.14 per cent. Second addition of helium to the

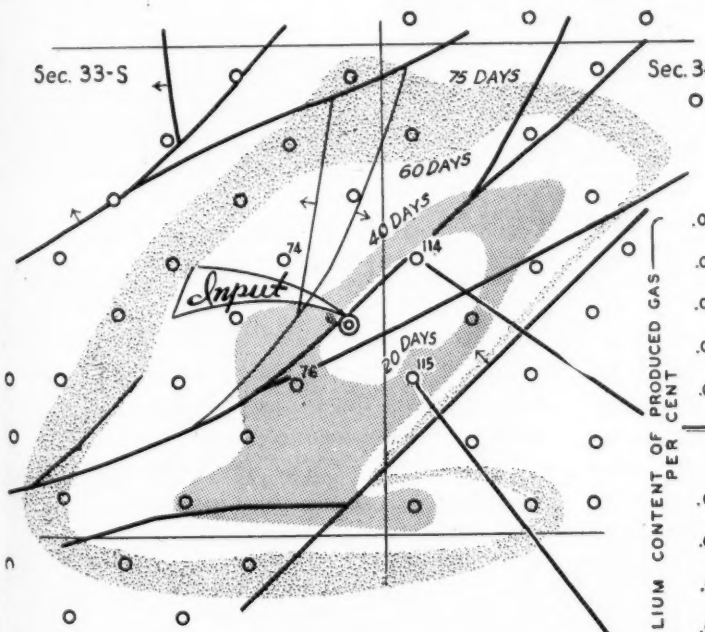
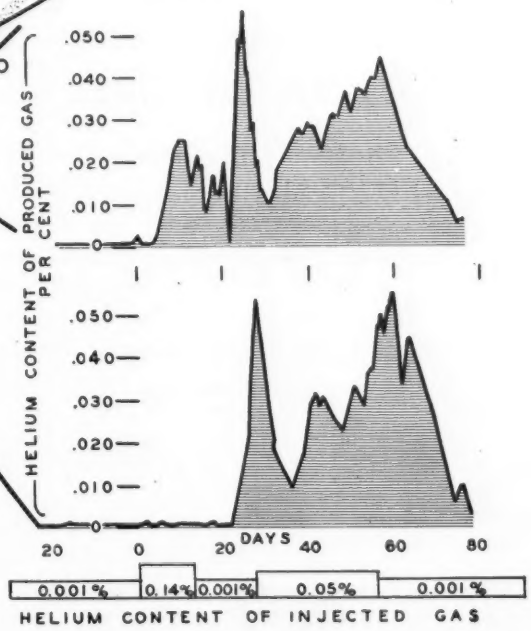


Fig. 1—(Above) Portion of the Elk Hills, Calif. field where the helium-tracer method was tested. Input well is double-circled. Single and double lines are faults established by electric log, sample, and b.hp. data. After the helium was admitted to the input well, its time-direction course, as shown, was plotted from helium tests of the gas from the producing wells. Note the helium tracer "passed through" many of the faults (Figure modified from U. S. B. M. RI-3897)

Fig. 2—(Below) Helium contents of natural gas produced from two of the offset wells during the injection tests. Helium was put into the input well during the first 14 days (0.14 per cent) and the 27-58th days (0.05 per cent)



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injected gas was June 21-July 20, 1945, in quantities to raise the helium content of the injected gas to approximately 0.05 per cent.

Results of Tests

Tests of the gas produced from the wells surrounding the input well are

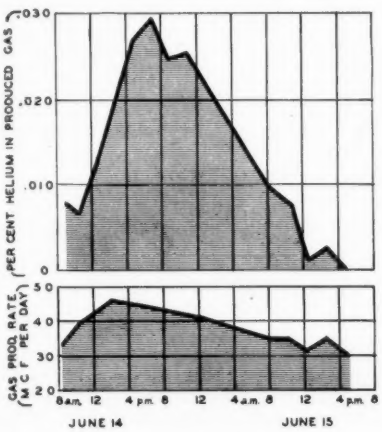

Fig. 3—Helium content of produced gas varied, as shown by this 2-hr. series of sampling. This was during the 21st and 22nd days of the injection test

shown in Fig. 1. In one of the offset wells (No. 114, 1,000 ft. distance), the helium-laden injected gas appeared within 5 days. In offset well No. 116, it appeared after 22 days, in offset well No. 76, after about 30 days, and in offset well No. 74, after approximately 55 days.

From helium test data of the natural gas from the producing wells, made after the injection of helium at the two time intervals previously mentioned, a plot was made of the distance gas had traveled by the end of 20, 40, 60, and 75 days (see Fig. 1).

Fig. 2 is one of Frost's charts of the helium tests on the natural gas produced by two of the wells offsetting the injection well. These charts make up part of the data contoured in Fig. 1. Frost states that the helium content of gas produced from the wells was found in many instances to vary in a cyclic manner. For example, samples taken several times daily from wells adjacent to the input well show the helium content variations as depicted in Fig. 3. Variations also were found in the helium content tests made of the producing wells before the helium additions were made to the injected gas. The helium content of gas produced from wells changed somewhat depending on the way the wells were handled. Invariably the helium content of the gas drawn from a well increased when a well was shut in, as though the helium was stratifying in the casing. Also, it was noted that the helium content of gas from a well sometimes was affected by changes in the operation of the well pump.

The variations of helium content always remained within narrow numerical limits. The average helium content of gas from one part of the field was not necessarily the same as that of gas from other parts of the field, but again the numerical differences in the sustained average contents were not great. This phenomenon, Frost reports, is not new to the bureau. In its search for commercial helium-bearing gas deposits, the Bureau of Mines has analyzed gases from many wells in many fields. Some fields have been under observation for more than 15 years. In many of the fields, adjacent wells do not necessarily have the same helium contents, and no tendency has been noted for the helium content of gases in different parts of the same reservoir to equalize.

In recognition of these two outstanding developments in the use of helium, both Cattell and Frost during May 1946, received the highest possible cash payments from the Department of the Interior Suggestions Committee, organized for the purpose of honoring Interior employes for useful suggestions or inventions. Both men received $1,000 in cash, with citations of an Award of Outstanding Achievement for Mr. Cattell and an Award of Excellence for Mr. Frost. Copies of the two helium publications, Report of Investigations 3897, "Helium Tracer Studies in the Elk Hills, Calif., Field," and Report of Investigations 3899, "Improved Apparatus and Procedure for the Determination of Helium in Natural Gas," may be obtained free by writing to the Bureau of Mines, Department of the Interior, Washington 25, D. C.

For Hot Weather Work—

Consider Use of Salt Tablets

by Henry W. Boggess*

THE human body and its chemical system is so complicated and intricate that the average layman can scarcely hope to understand the wondrous machine that we call "man."

Medical science for many centuries has accepted the responsibility of studying and administering to the human body. Its progress within the last three decades has been decidedly noteworthy.

Until recent years it was assumed that hot weather produced a natural toll of sickness among workmen engaged in work requiring physical exertion. Heat exhaustion, muscle cramps and sun stroke were considered inevitable. We now know something of the causes of these hot weather maladies and are able to prescribe for their prevention as well as to more adequately care for victims.

Fatigue, muscle cramps and a more or less general debility suffered by apparently normal and healthy men in hot weather are often due to excessive perspiration. Such perspiration causes loss of necessary salt from the system. To replace the salt in the system lost through perspiration is to preserve energy and normal strength.

The ordinary method of replacing salt lost through perspiration is by taking salt tablets. However, the common 10 (or even 5) grain salt tablet may produce nausea to some people.

*Superintendent, Personnel Department, Sinclair Prairie Oil Co.

Recently there has been developed an "enteric" coated salt tablet of which it is claimed that disintegration of the salt cannot take place until it reaches the small intestine.

Salt sickness, or nausea, is thought to be caused by excessive salt dissolution in the stomach. Inasmuch as salt is absorbed in the system only through the walls of the small intestine and not the stomach, it has been found that sickness due to salt may be often overcome by the use of "coated" rather than common salt tablets.

In any event, salt is essential to maintenance of vigor and strength of any person whose work induces excessive perspiration. In hot weather, salt is indispensable to good health; taken in moderate amounts, and using "coated" tablets if susceptible to salt sickness, the chances of becoming exhausted or of having cramps due to heat is greatly minimized.

Well Interference and Reservoir Drainage ... A Comment

by Jack H. Abernathy*

THE subject treated by Barnes in his series of articles in The Oil and Gas Journal of April 13 and 20 and May 14 and 18, 1946, was "Well Interference." A discussion of well interference is actually a discussion of well spacing by another and perhaps more polite name. One of the case-history examples of long-range drainage cited by Barnes is the well-known Mansion extension area of the Oklahoma City Wilcox pool. In the following comments this example will be elaborated upon.

A number of engineers have found, as pointed out by Barnes, that more than 60,000,000 bbl. of oil migrated from the undrilled area and was produced from wells in the developed portion of the pool prior to the time the Mansion area was discovered (see Fig. 1). This extra oil was accompanied by 180,000,000,000 cu. ft. of gas which also migrated. Expressed differently, 13.3 per cent of the oil and 52 per cent of the gas originally in place in the Mansion area moved to and was produced from wells in the adjacent area. As a matter of fact this oil and gas migration continued until approximately equal pressures were established in the older and newer areas, i.e., until about March 31, 1938, although development of the north end began early in 1936. The magnitude and long-range nature of this mass transfer of reservoir fluids becomes more striking when it is found that about 37,500,000 bbl. of the oil migration was occasioned by the advance of water into an area 2 to 3 miles removed from the producing wells.

To leave the example at this point, certainly it should be said that well spacing in Oklahoma City (averaging one well per city block, or one well to 5 acres) was far too close and that relatively few wells should have sufficed to economically deplete the Wilcox reservoir. Yet it is known that such a statement is not entirely valid, for certain wells have been drilled in recent years penetrating the sand at points entirely surrounded by older producers and these late tests have in some instances produced remarkable volumes of oil. No question of faulting, or of reservoir discontinuity is involved. How then, can these two contradictory and yet demonstrable phenomena be reconciled?

Key to this entire matter of drainage and well spacing in the Oklahoma City Wilcox reservoir lies in the pressure-time history of the pool. Fig. 2 shows graphically the pressure gradient as it existed longitudinally in the field from north to south, at approximate yearly intervals. Pressures shown are weighted on a sand-volume basis. This figure discloses that before 1938 a marked pressure differential existed between the northern (the newer) portion of the pool and the older area to the south.

As long as bottom-hole pressures remained high, and as long as substantial pressure differences existed or could be induced between one part of the pool and another, drainage was effective over long distances and optimum spacing was wide. Further, high differential pressures caused large quantities of water to flow into the limits of the original oil reservoir, this water displacing millions of barrels of oil to wells. However, when pressures became reduced to a low level and when differentials from the pay sand to individual well bores became small, the drainage radius of the wells was correspondingly reduced and very close spacing became necessary to deplete the reservoir of its remaining oil.

Reservoir studies have shown that during the early life of the field, and through 1937, water moved into the oil and gas reservoir at the average daily rate of approximately 200,000 bbl.; however, since about April 1, 1938, water influx into the reservoir has been not more than 15,000 bbl. per day and may be considerably less

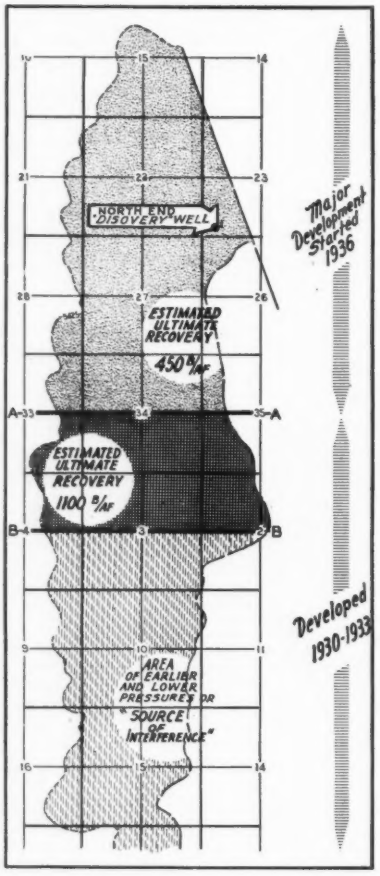

Fig. 1—(Left) Illustration of "intra-reservoir interference" and long distance-large quantity movement of oil (from Barnes). Due to earlier development to the south and consequent lower reservoir pressures there, an estimated 60 million barrels of oil migrated from the area north of A-A. The calculation indicates this is being recovered in the sector A-A to B-B

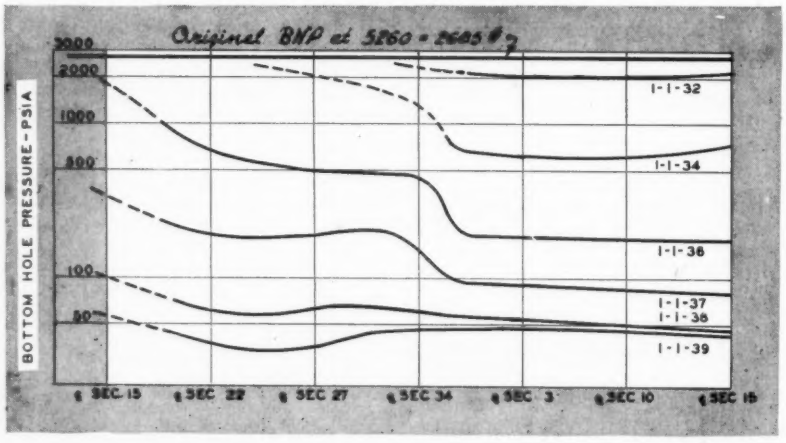

Fig. 2—(Below) These are the north-to-south bottom-hole pressure gradients through the center of the pool (see Fig. 1), consecutively by years (Abernathy)

*Big Chief Drilling Co., Oklahoma City.

than this low figure. Apparently, practically all the water movement into the reservoir came as a result of expansion of water in the surrounding water-bearing sand as pressures were lowered; therefore, in this particular pool it would not have been practical to reduce production rates to utilize more effectively the natural water drive owing to the limited replenishment of water in the Wilcox aquifer.

Extending the period of time of pressure decline and water expansion would not have increased the volume to which the water could be expanded; hence, the only really effective measure for improving our production practices would have been the down-dip injection of water (following, or rather preceding, the technique now in use so successfully in the Midway pool in Arkansas). Unfortunately, at that time the knowledge of reservoir technology had not reached its present stage of development and thus early stage water injection was not considered feasible.

Of course, a more favorable use of solution gas would have improved reservoir performance since a large portion of the reservoir void space came about through release of solution gas and consequent shrinkage of the oil remaining in the sand. The natural water drive had to make up for this shrinkage before oil could be displaced to well bores and any such shrinkage "saved" by proper production and gas conservation methods would have been reflected directly in increased recovery of oil by the water drive.

As a result of this experience, perhaps there is justification in drawing the following principles of rather general application to the problem of well spacing in a homogeneous reservoir:

1. Where conditions of natural water drive exist and where withdrawals are restricted to a rate comparable to the rate at which water encroaches, wide spacing can be most effective in obtaining recovery of oil.

2. The inverse of principle 1 is also valid; if pressures are allowed to deplete, quite close spacing is necessary to obtain an efficient recovery of the oil in place.

3. If natural water drive does not exist, very careful consideration should be given to early down-dip injection of water since dissolved gas drive, gas cap drive, and the gravity drainage mechanisms are poor substitutes for encroaching water. These lesser forces can, however, be so utilized as to materially assist the natural or artificial water drives.

Other Comment

Letters other than those published in "What Others Say" on this subject (The Oil and Gas Journal, July 13, 1946) are as follows:

Real Problem Is Avoidance Of Unnecessary Wells

Sirs:

Despite the extreme interest in interference tests with regard to statutory spacing and proration problems, and even though various A.P.I. committees are attempting to analyze the material, the final value of the material in controversial questions is still questionable. In other words, the tests do give valuable indications of the producing characteristics of the reservoir and the mechanics of depletion, but they do not prove beyond doubt that certain numerical spacing values are more suitable for a given area.

The real well spacing problem today within practical limits is a relatively minor one, because we are talking mostly of 20 and 40-acre density with few exceptions. The real problem is the avoidance of having to complete unnecessary wells to recover the greatest profitable amount of oil from the field. This simply means that we need greater flexibility under leasing and statutory regulations, now attainable only through complete unitization, to drill and produce only those wells necessary to define the limits and nature of the pool and then to recover the fluid, with particular regard to the predominant producing mechanism.

In determining what production mechanism actually controls the recovery from the bulk volume of the reservoir, interference tests are very helpful. Even though an active water drive would assure highest recoveries in a uniform pay, it is often possible to determine that there is such extreme interconnection of relatively high permeability streaks that much oil will be bypassed in tighter portions of the pay and left unrecovered unless the pressure in the reservoir is finally lowered to some point far below that contemplated in conventional water drive operation.

From a practical angle, the other final word I have is that only too often the

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best of reservoir analyses are heavily handicapped by the fact that pool production of gas and water is often not known and estimates may be too inaccurate for sound calculation. This goes back again to the fact that insufficient production information of oil, gas, and water is available for individual wells. Without this detailed, vital information, we usually arrive at rather uncertain figures, whereas such fundamental measurements of fluid withdrawals should be gathered as a first element in the development of any pool.

R. W. FRENCH,
Asst. Mgr. Prod. and Drlg. Dept. East of Rocky Mountains, Continental Oil Co., Ponca City, Okla.

Data Helpful on Reservoir Performance, Spacing

Sirs:

I was most interested in reading the articles on "Well Interference" as they were published. The type of study exemplified by this series of articles is one of the directions which will ultimately give us a clearer understanding of the entire problem of reservoir performance and the correlated problem of well spacing. It will not give all the answers and there may well be variation in the interpretation of the information gathered by the attack here used together with some being followed by the American Petroleum Institute's special study committee on allocation of production and well spacing. I believe your journal is to be commended for publishing the articles.

EDGAR KRAUS,
Atlantic Refining Co., Dallas.

Maximum Interference in Flooding Gives Best Fluid-Oil Ratio

Sirs:

In reference to Ken Barnes' articles on "Well Interference". . . I feel that such reviews of special divisions of petroleum engineering are extremely useful and more of them would be desirable.

It has been my feeling that some engineers believe well interference to be a necessary evil in oil production. While this certainly holds in some cases, it is not true in many other instances. For example, in the secondary recovery of petroleum, interference between injection wells is advantageous in moving oil towards the producing wells. In fact, a maximum of interference in such cases results in the most favorable drive fluid-oil ratio.

S. T. YUSTER,
Petroleum and Natural Gas Division, Department of Mineral Engineering, Pennsylvania State College.

BOOKS

MODERN PLASTICS ENCYCLOPEDIA. Published by Plastics Catalogue Corp., 122 East 42nd Street, New York. 1,389 pp.

This is an elaborate volume, handsomely bound, fully indexed, and tabbed for quick finding of subject matter. It should answer any question the reader may have on the subject of plastics. There is a section on technical data, one on materials, and others on engineering design, molding and casting, fabricating and finishing, machinery and equipment, laminates, resin-wood products, coatings, synthetic rubber, and a bibliography and directory. In addition to the bound volume, there is an additional group of charts, enclosed in an accompanying envelope, on identification, properties, chemical formulas, adhesives, etc.

The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Fuel Combustion Characteristics

TABLE 1—COMBUSTION CHARACTERISTICS OF LIQUID FUELS

Fuel—	A.P.I.	H_2O	Ultimate analysis, per cent C	H_2	S	Undetermined ash	Heating value, B.t.u. per lb. liquid Gross	Net	Lb. air per lb. fuel at 0% excess air*	Per cent CO_2 at zero % excess air*
1. Commercial butane	†0.581	....	83.0	17.0	....	....	21,650	20,240	15.42	12.0
2. Stove gasoline	66.0	....	86.0	14.0	....	....	20,400	19,000	14.76	13.1
3. Furnace distillate	38.0	....	87.0	13.0	....	....	19,650	18,450	14.47	13.5
4. Topped crude, California	26.2	0.89	85.8	12.09	1.19	0.04	19,053	18,001	14.12	15.6
5. Mid-Continent topped crude	25.5	....	86.5	12.38	0.46	0.76	19,182	18,002	14.1	15.6
6. Mid-Continent topped crude	25.1	0.33	86.2	12.39	0.39	0.69	19,256	18,076	14.1	15.6
7. Topped crude, Kentucky	24.4	....	87.1	12.53	0.22	0.15	19,358	18,168	14.35	15.6
8. Mid-Continent residuum	22.0	0.05	87.4	11.1	0.42	1.03	18,778	17,723	14.0	16.0
9. Residual fuel oil, California	16.5	0.05	87.5	10.17	1.14	1.14	18,319	17,351	13.7	16.4
10. Residual fuel oil, Kentucky	15.2	0.05	88.7	10.23	0.3	0.72	18,651	17,677	13.8	16.4
11. Mid-Continent residuum	14.3	0.05	87.6	10.27	0.7	1.38	18,454	17,479	13.7	16.4
12. Mexican crude	13.6	1.85	83.7	10.2	4.15	0.10	18,710	17,767	13.4	16.2
13. Cracked fuel oil, California	11.3	0.3	86.5	10.04	1.49	1.67	18,088	17,128	13.5	16.4
14. Mid-Continent cracked residuum	10.7	....	88.5	9.92	0.77	0.81	18,293	17,349	13.65	16.5
15. Mid-Continent cracked residuum	9.2	0.4	88.4	9.95	0.68	0.81	18,274	17,324	13.7	16.6
16. Mid-Continent cracked residuum	8.6	....	88.9	9.8	0.56	0.74	18,277	17,345	13.7	16.6
17. Mid-Continent residuum	8.1	0.25	88.5	9.07	0.67	1.51	18,077	17,212	13.4	16.9
18. Cracked residuum, Calif.	8.0	0.05	88.3	9.5	1.2	0.95	18,084	17,179	13.5	16.7
19. Residual fuel oil, California	7.6	0.10	87.5	9.38	1.37	1.65	17,970	17,075	13.4	16.8
20. Cracked residuum, Ky.	3.3	....	90.6	8.49	0.41	0.50	17,837	17,030	13.4	17.1
21. Bituminous coal, Pennsylvania		2.5	77.8	4.8	1.2	13.7	13,997	13,543	10.4	18.6
22. Bituminous coal, Missouri		2.6	72.6	4.6	1.8	17.4	13,533	13,098	9.7	18.6
23. Petroleum coke		1.2	96.0	2.1	0.41	0.29	15,241	15,040	11.9	18.9

*On "as fired" basis. †Specific gravity at 60° F.

TABLE 2—COMBUSTION CHARACTERISTICS OF GASEOUS FUELS

Material—	Mol. wt.	Density, lb. per cu.ft. at 60° F.	Analysis, volume per cent CH_4	C_2H_4	C_2H_6	C_3H_6	C_3H_8	C_4H_8	C_4H_{10}	C_5H_{12}+	Heating value B.t.u. per cu. ft. at 60° F. Gross	Net	Cu. ft. air per cu. ft. fuel at 0% excess air	Per cent CO_2 at zero % excess air
1. Methane	16.0	0.0422	100.0	....	....	....	....	....	....	....	1,009	909	9.57	11.65
2. Ethane	30.0	0.0792	....	100.0	....	....	....	....	....	....	1,795	1,644	16.75	13.1
3. Propane	44.0	0.1162	....	....	....	100.0	....	....	....	....	2,580	2,379	23.9	13.7
4. Butane	58.0	0.153	....	....	....	....	....	....	100.0	....	3,350	3,099	31.1	14.0
5. Propane stabilizer	31.2	0.0823	4.3	82.7	....	13.0	....	....	....	....	1,865	1,710	17.37	13.0
6. Cracked gas, dry	21.7	0.0572	64.5	16.0	1.9	6.7	1.3	2.9	0.6	5.7	1,316	1,200	12.34	11.5
7. Refinery gas, wet	32.0	0.0844	46.8	16.5	....	18.8	....	12.2	5.7	3.0	1,892	1,734	17.80	12.7
8. Natural gas, wet	21.8	0.0577	80.0	6.6	....	6.3	....	3.7	3.0	1.4	1,360	1,240	12.56	11.99
9. Natural gas, wet	20.5	0.0541	81.3	9.8	....	5.6	....	1.7	1.4	0.1	1,253	1,137	11.65	11.96
10. Natural gas, dry	19.5	....	85.1	6.1	....	7.4	....	1.2	0.1	0.2	1,200	1,087	11.34	11.9
11. Natural gas, dry	18.6	0.049	86.6	8.6	....	3.9	....	0.7	0.2	0.2	1,160	1,050	10.95	11.89
12. Natural gas, dry	17.3	0.0458	90.7	6.2	....	2.1	....	1.0	....	....	1,112	1,005	10.58	11.81
13. Cracked gas, wet	35.0	0.098	34.6	1.7	21.6	4.7	17.4	3.0	7.5	9.3	2,058	1,892	19.38	12.91

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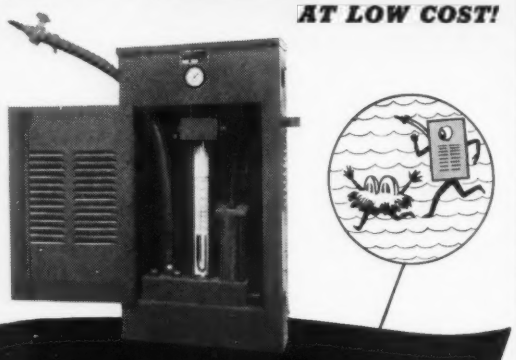

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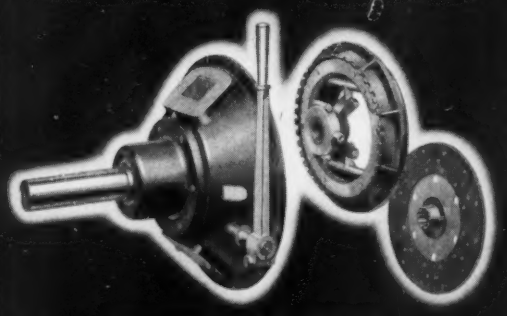

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Engineering Fundamentals

No. 247

A FEATURE OF THE OIL AND GAS JOURNAL

Beaman Stadia Arc—Practice

THE Beaman arc in one form or another is almost universally used on the plane-table alidade, an instrument that would probably be used more than it is today if more surveyors understood the workings of the Beaman scale. However, the Beaman arc is easy to understand, and it is hoped that this brief discussion will encourage more people to use the plane table.

The alidade is shown in Fig. 1. The Beaman arc (A) is attached to one end of the horizontal axis (B). The telescope (C) is fastened to the horizontal axis, so that when the telescope is rotated about the horizontal axis of the instrument the Beaman arc turns with it. The telescope can be fixed in any position by tightening the clamp on the horizontal axis (D). Slight movements of the telescope can be made, even though the horizontal axis is clamped, by turning the tangent screw (E). Before reading the Beaman arc by means of the index (F), the bubble should be centered in the vernier control level (G) by the tangent screw (H). An enlarged view of the Beaman arc was shown in the previous installment (No. 245).

An illustration will demonstrate the ease with which the Beaman arc is used. Fig. 2 indicates an alidade on top of a plane table set up over point X preparatory to taking a stadia sight on point Y. After the table is set up over point X and leveled, the height of the instrument is measured. Assume this to be 3.4 ft. The telescope is then pointed at the stadia board held on point Y. As for any stadia reading the intercept is determined by setting the lower hair at some whole foot mark and reading the upper hair wherever it falls. This should be done in such a manner as to displace the middle hair a minimum amount from the H.I. value; however, this is not as important in plane-table work as it is in stadia observations done with a transit. In the illustration assume that the lower hair is set at 2.00 ft. and that the upper hair falls at 6.42 ft.; then s = 6.42 — 2.00 = 4.42 ft. The control level (G, Fig. 1) is leveled by means of the tangent screw (H, Fig. 1) and the horizontal scale is read. The H scale is usually read to the nearest 0.1 by estimation. Suppose it reads 2.6. The horizontal distance from X to Y is now found by multiplying the stadia intercept by 2.6 and subtracting the product from 100 × s. Neglecting the quantity (f + c) in this illustration the calculations are:

Correction to horizontal distance = 2.6 × 4.42 ft. = 11.5 ft.

Horizontal distance = 100 × 4.42 ft. — 11.5 ft. = 442 ft. — 11.5 ft. = 430.5 ft.

By means of the tangent screw which controls the vertical motion of the telescope (E, Fig. 1) the index of the vertical scale is moved until it is coincident with the line on the V scale with which it was most nearly coincident. In this case the index most likely would be set so that it fell exactly opposite the 34 mark on the vertical scale. This will cause (in this illustration) the telescope to be depressed still more and the middle horizontal hair to fall on 4.1 ft., as indicated in Fig. 2. Difference in elevation between the horizontal axis of the instrument and the point sighted on the rod is found by multiplying the stadia intercept (s) by (34 — 50), or —16. Again neglecting (f + c).

Difference in elevation = —16 × 4.42 ft. = —70.7 ft.

Since the line of sight is 3.4 ft. above X and 4.1 ft. above Y and since Y is below X it follows that the net difference in elevation between X and Y is:

—70.7 ft. + 3.4 — 4.1 = —70.7 — 0.7 = — 71.4 ft.

Chief advantage of the Beaman stadia arc is that reductions of angles and stadia intercepts to distance and difference in elevation may be made in the field. Hence elevations can be plotted, particularly if the plane table and alidade are used, and contours can be sketched in the field as the work progresses. This is a decided advantage.

Example: With the stadia board held at point Z an intercept of 8.17 is read when the H scale reads 3.6; the V scale is then set at 68 at which time the middle horizontal crosshair falls at 5.8 ft. on the rod. If the height of the instrument is 3.2 ft., compute the horizontal distance and difference in elevation between the point occupied and the point sighted neglecting (f + c) for the instrument.

Solution:

Horizontal distance = 100 × 8.17 — 3.6 × 8.17 = 817 — 29 = 788 ft.

Difference in elevation = 8.17 (68 — 50) + 3.2 — 5.8 = 8.17 × 18 + 3.2 — 5.8 = 144.5 ft.

Data for the two above illustrations are recorded below in a form suggested for keeping such field notes.

General equations for the reduction of notes taken with a Beaman arc (illustrated in Fig. 2 and tabulated in Table 1) might well be given as follows:

Horizontal distance = 100 × s — H scale reading × s (1)

Diff. in elev. = (V scale reading — 50) × s + H.I. — rod reading (2)

When Equation 2 is used the algebraic signs of the equation must be carefully observed.

TABLE 1—BEAMAN ARC NOTES

Point	Stadia intercept, s	Beaman arc H	Beaman arc V	Rod reading	H.I.	Horizontal distance	Diff. in elev., ft.
Y	4.42	2.6	34	4.1	3.4	430	—71.4
Z	8.17	3.6	68	5.8	3.2	788	+144.5

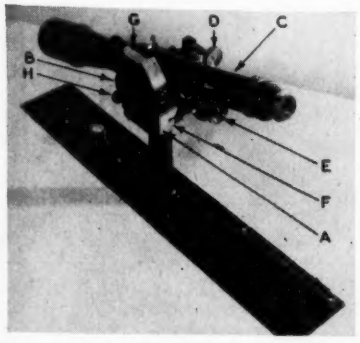

Fig. 1

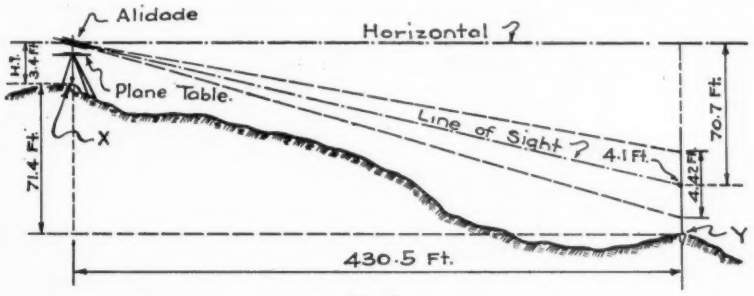

Fig. 2

Series prepared by Dr. E. A. Stephenson, head of petroleum engineering school, and Prof. D. Don Haines, department of civil engineering, University of Kansas

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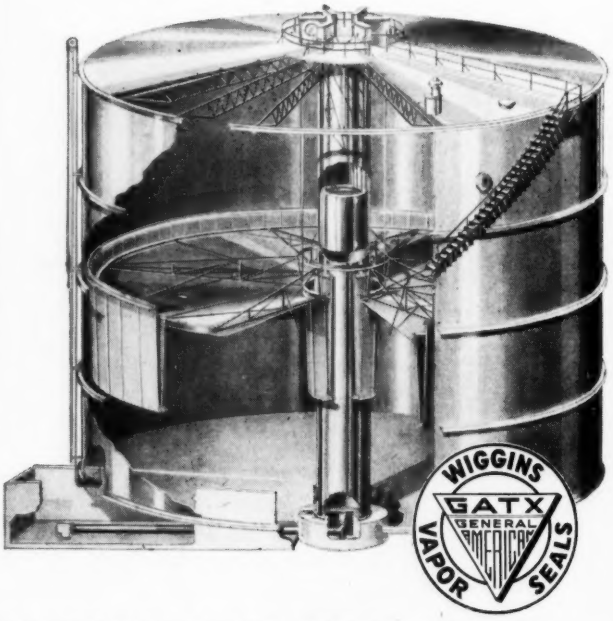

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NATURAL GAS

Mississippi Board Studies Gwinville Spacing Plans

JACKSON, Miss. — The Mississippi Oil and Gas Board, in a public hearing last week, heard numerous operators testify that 640-acre spacing units for gas wells in Gwinville field in Jeff Davis County is advisable both from a physical and economic standpoint.

The board recessed without taking action on several petitions for 640-acre gas-well spacing and 40-acre oil-well spacing in the field. It will meet again August 7 to hear petitions for allowable takes in Heidelberg field, Jasper County, and August 20 to hear petitions for regulations governing operations in Baxterville field, Lamar County.

Douglas Bell, petroleum engineer for the Humble Oil & Refining Co., told the board that Gwinville, with about 16,000 acres of proven production, has estimated reserves of 765,000,000,000 cu. ft. of gas, 10,000,000 bbl. of condensate and 5,000,000 bbl. of oil.

Based on the current market demand of between 50,000,000 and 55,000,000 cu. ft. of gas per day and the physical structure of the field, operators testified that about 25 wells could safely and sufficiently drain the gas reservoir. There are now 11 gas wells and 5 oil wells in the field. J. C. Posgate, assistant division petroleum engineer for Humble, testified that Gwinville wells cost between $100,000 and $120,000 to drill and that it took a minimum of 2,000,000 cu. ft. of production per day to justify the cost.

FPC Authorizes Sale Of Cabot Properties

WASHINGTON.—New York State Natural Gas Corp., New York, has been authorized to purchase for $799,998 in cash, all properties and facilities in New York and Pennsylvania owned by Godfrey L. Cabot, Inc., and Cabot Gas Corp., with the exception of production properties known as the Wharton properties and certain distribution facilities in New York State, a Federal Power Commission bulletin made known this week.

The company is also authorized to serve gas to the former customers of Cabot, including the Pavilion Natural Gas Co., Producers Gas Co., Southern Tier Gas Corp., Empire Gas & Fuel Co., Ltd., and a new customer, Rochester Gas & Electric Corp.

FPC Accepts New Rates Of Southern Natural Gas

WASHINGTON. — Southern Natural Gas Co., Birmingham, Ala., will reduce its rates for interstate sales of natural gas by 11 per cent annually, or $1,211,946 based on 1945 sales, in accordance with new rate schedules accepted by the Federal Power Commission in an order made public this week.

The reduction in rates, affecting customer companies in Alabama, Georgia, and Mississippi, was made in compliance with an FPC order of March 30, 1946, in which Southern Natural was ordered to effect reductions of not less than $1,200,000 annually, effective May 1, 1946.

Lone Star Wins Utility Tax Refund

AUSTIN, Tex.—Lone Star Gas Co. recently won its tax suit in the state's Third Court of Civil Appeals to recover $55,780.68 paid as gas utility taxes for the first quarter of 1943.

In 1943 Lone Star reorganized and took over all assets of its former parent corporation, starting the year as a newly created organization. Appeal was made to the court questioning the state's rights to assess first-quarter 1943 taxes based on fourth-quarter 1942 business receipts by the former corporation. The court held the new company was a "beginner" and therefore subject only to the $50 beginner's tax prescribed by Texas law.

Railroad Commission Sets New Spacing, Potentials

AUSTIN. — The Texas Railroad Commission last week ordered increased allowables for gas wells on tracts of more than 40 acres to the well in the lower Pettit section of Chapel Hill field of Smith County, decreased gas-oil ratios in one field and revised some previous spacing orders.

In the Alief gas field, Harris County, new spacing announced is 1,320 ft. between wells and 660 ft. from property lines, with 160-acre proration units. Hamel field, Colorado County: Spacing, 933 ft., and 467 ft. from property lines, with 40-acre proration units and allowables based 50 per cent upon wells and 50 per cent upon acreage. Falls City field, Karnes County: Spacing, 660 ft., and 330 ft. from property lines. Williams field, Coleman County: Reducing from 3,500 cu. ft. of gas per barrel of oil to 2,000 cu. ft.

Meanwhile, the commission said the 6-month suspension of proration rules in the Carthage gas field of Panola County, East Texas, will expire August 1, at which time a new method of allocating production based on reservoir pressure and acreage will be instituted.

The commission holds that the open-flow potential method now used in setting allowables is inaccurate and wasteful. Hearing on the potential and for revision of other rules and regulations in the field will be held early in August.

Underground Gas Storage Finding Increasing Use

WINDSOR, Ont.—The underground storage of natural gas may be expected to develop to a great extent in the future, according to a paper presented by G. W. Skeels, assistant to the vice president of Dominion Natural Gas Co., Ltd., at the recent convention of the Natural Gas and Petroleum Association of Canada. In reviewing the progress of this method of storing gas, Skeels asserted that the ability to supply year-around 100 per cent gas service would be an impossibility without the aid of one or more underground-storage projects.

Gas was first stored underground in 1915 near Welland, Ont., he said, and has developed to the extent that now many natural-gas companies carry more than half their total winter loads by this method, with at least 65 such projects in the United States as of May 1944. Underground-storage pools have become nearly the perfect factor in harmonizing high pipe-line load factors with seasonal demands of the consumer, he said. While some underground reservoirs are used only a few days each winter, Skeels stated, others are used nearly every day of the winter months.

Most storage units now in use originated by the injection of gas into a partially depleted gas pool. However, he asserted, a depleted pool is not always the most successful. In fact, it is becoming increasingly apparent that the use of a newly discovered pool is often more suitable as a storage unit, as the deliverability of any unit is directly proportional to the static pressure of the gas stored in the unit. The greater the pressure, the faster the rate at which it can be recovered.

REFINING

Survey Shows Octane Peak Last Winter

WASHINGTON. — American motorists during the winter of 1945-46 received the best premium and regular-grade motor fuels in respect to octane ratings ever sold in service stations of the United States, according to the semiannual survey of motor fuels by the Bureau of Mines.

Based on the analysis of 3,735 individual samples from 21 major marketing areas of the country, the first peace-time survey since the summer of 1941 revealed that the average octane number of premium grade motor fuels sold last winter was 80.9, compared with a 1935-36 winter average of 76.7, and a prewar high average of 80.4, in the summer of 1941. The average octane number of regular gasoline sold in the past winter was 75.9, compared with 69.5 a decade earlier, and a prewar high average of 74.7, also in the summer of 1941.

Since this survey was made, octane ratings have declined due to the current lead shortage. The Government now has a 78.5 limit on premium.

During the summer of 1945 in the closing months of the war when octane ratings reached their lowest level, the average for premium-grade motor fuel was only 74.9, and the average for regular motor fuel was 69.7. The ratings last winter reflect an increase of 6 octane numbers in both grades of fuel.

The 1945-46 winter survey of motor fuels of the country was the nineteenth in a series inaugurated by the Bureau of Mines in 1936 in cooperation with the coordinating fuel research committee of the Coordinating Research Council, Inc. Information in the current report was compiled by O. C. Blade, petroleum chemist, and C. R. Sponsler, scientific aide, both of the Bureau's petroleum experiment station at Bartlesville, Okla.

The following tabulation summarizes octane numbers by areas:

Area—	Octane numbers, Winter 1945-46 Premium	Regular
Boston	80.9	76.9
New York	81.3	76.9
Washington, D. C.	81.3	76.7
Pittsburgh	81.1	76.8
Cleveland	80.0	76.0
Detroit	80.0	75.6
Atlanta	81.2	76.9
Memphis	80.7	76.2
Chicago	79.7	75.1
New Orleans	81.2	76.4
St. Louis	80.0	75.1
Minneapolis	79.5	74.9
Omaha	79.9	75.1
Tulsa	79.5	75.1
Texas	80.3	76.2
South Rocky Mountain	80.5	75.4
Middle Rocky Mountain	79.4	74.3
North Rocky Mountain	79.5	74.1
Seattle	84.4	76.1
Los Angeles	84.1	76.4
San Francisco	84.3	77.1
National average	80.9	75.9

Employment in Refining Reaches 127,000 Peak

WASHINGTON.—Total employment in 111 petroleum refining plants has risen steadily since September 1945, to a total of about 127,000 in May 1946, the United States Department of Labor reported recently. Additional labor needs through October were placed at 1,400, but applicants are plentiful for the moderate number of jobs available.

Additional labor needs for expansion are minor, and stability of employment is evidenced by the fact that 78 of the 111 reporting establishments anticipated changes of 10 or fewer workers within the next 2 months. Employment of veterans has increased, bringing the percentage of veterans to 21 per cent of the total labor force in the refining industry.

Nicaragua Terminal to Be Built for The Texas Co.

LONG BEACH, Calif. — Transpacific Construction Co., Long Beach, is moving into Montelimar, Nicaragua, to construct an oil and gas terminal for The Texas Co.

This work comprises installing pipe lines, sewage systems, water systems, fire banks, construction of a garage, warehouse, pump house, roads and other facilities.

W. A. Thompson, Jr., consulting engineer for Transpacific Construction, is leaving for Mexico, Nicaragua, and the Canal Zone to make an investigation preliminary to starting construction.

Wisconsin Oil Refining Outlines Improvements

SHEBOYGAN, Wis. — New expansion plans and improvements for Wisconsin Oil Refining Co.'s plant here were announced last week by Dewey E. Foster, president. Crude refining capacity will be enlarged from 5,000 bbl. to 8,000 bbl. a day, and a catalytic reforming unit will be added to produce 80-octane gasoline.

Other improvements will be the addition of a vacuum distillation unit and new dock facilities. A new pipe line from Sheboygan Harbor to the refinery and the building of two 25,000 bbl. storage tanks also are planned. Construction of a catalytic cracking unit in 1948 is under consideration.

Ashland Inaugurates Training for Foremen

ASHLAND, Ky.—The Ashland Oil & Refining Co. is giving a refinery training course designed to take all foremen through every kind of training which might be applicable to their work and to promote employer-employe relationships. Jim Hiatt is director of the program.

The first meetings are taking the form of a conference at which questions are asked so that principal problems confronting foremen can be brought out for a general preliminary survey.

In addition to the regular conference sessions, outside specialists will be brought in from time to time to

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discuss subjects of which they have a particularly thorough knowledge.

Hiatt's background for the courses includes postgraduate work in vocational education at the University of Cincinnati. He was a member of the university staff as a coordinator for its program of education and training within industry.

Socony-Vacuum Develops Moisture-Absorbing Bead

NEW YORK. — Development of a small bead that can hold up to 40 per cent of its weight in moisture and then be reactivated in a few minutes of drying in an oven has been announced by Socony-Vacuum Oil Co., Inc.

Dr. John C. Dean said that product already is being used as a maintenance measure in the storing of reserve American ships. Company chemists said the bead does not become powdery in use.

At the same time, Dr. A. A. Kelly, assistant research director for the company, announced development of three new chemical compounds derived from petroleum. They are variations of thiophene and are expected to be of use in dye-making, the steel industry, and in pharmaceuticals.

Navy Releases Gulf Plant, Last Oil Property Held

WASHINGTON.—Release of Gulf Oil Corp.'s refinery at Toledo, Ohio, was announced last week by the Navy. The refinery is the last of the 49 oil plants and 4 pipe lines freed from Navy control resulting from their seizure during last October's strike.

Refining Groups Protest Fuel-Oil Specifications

Fuel-oil specifications recently announced by the oil division of the Institute of Cooking and Heating Appliance Manufacturers are meeting objections from refining interests on grounds they will tend to eliminate use of catalytically cracked fuel.

The specifications adopted by the institute provide an A.P.I. gravity of 36 minimum at 60° F. and a kinematic viscosity at 77° F. of 2.3 minimum and 2.9 maximum. A refining industry spokesman said last week most of the catalytically cracked material carries a viscosity of 3.1 to 3.2, though some blends are lower. In protesting the specifications, he said the industry is looking forward to the time when most fuel oil will be catalytically cracked. In contrast to the 36 minimum gravity requirement, gravity of catalytically cracked oil ranges down to 26-28.

The institute's specifications call for a distillation range, 10 per cent at 420° F. maximum, and final boiling point of 625° F. maximum.

Acetylene Report Available

WASHINGTON. — Secrets of German success in handling acetylene in chemical operations at unusually high pressure and temperatures are revealed in a report made by investigators for the Joint Intelligence Objectives Agency and now available from the Office of Technical Services, Department of Commerce. The report presents German research data on factors and conditions under which acetylene decomposes, includes descriptions of the effect of the presence of nitrogen and water in acetylene processes, and of equipment which will inhibit explosions, and discusses the desensitization of liquid

Refining Dividends Gain

WASHINGTON. — Divident payments made by companies in the oil-refining industry during May increased $500,000 over May 1945, according to a report by the Department of Commerce. May 1946 payments amounted to $5,000,000. Payments for the 3-month period, February through April, totaled $56,000,000, against $55,000,000 in the corresponding 1945 period.

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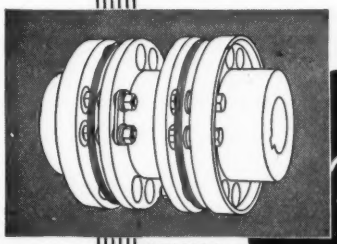

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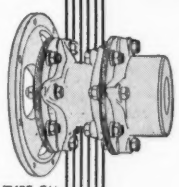
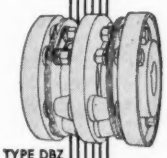


TYPE CM



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PIPE LINES

Railroad Studying Costs of Line Planned by Cosden

BIG SPRING, Tex.—Texas & Pacific Railway Co. officials are studying the possibility of new petroleum rates to meet the competition offered by Cosden Petroleum Corp.'s proposed new products line.

Cosden's traffic manager conferred last week with executives of the railroad in Dallas. Cosden's proposed pipe line would extend from its 15,000-bbl. daily capacity refinery in Big Spring to the Dallas-Fort Worth area. A 4-in. line is planned on a right-of-way which would be parallel to T. & P.'s main line.

"The railway company representatives have stated that they want to study their costs with the view of proposing multiple-car rates which would be competitive with pipe-line transportation costs," said R. L. Tollett, Cosden president. "This is something new. We are furnishing them our estimates of operating costs for their consideration."

Despite this development, however, engineering work on the line is proceeding, Tollett said. The company is planning distribution terminals at various intermediate points on the line.

Shell Pipe Line Employes Favor Independent Unions

Employes of Shell Pipe Line Corp. in the Mid-Continent area recently voted to reject the Oil Workers International Union-C.I.O. as a collective bargaining agency. This action follows that of the Texas-Gulf area employes of the company. Consequently, both Mid-Continent and Texas-Gulf employes will continue to be represented by the independent unions which have been serving them for about 10 years.

As determined by National Labor Relations Board tally of mail ballots counted July 17, the Mid-Continent vote was as follows: For independent union, 250; for O.W.I.U.-C.I.O., 72. Votes were cast by 92.6 per cent of the total number of eligible employes.

In the cases of both the Mid-Continent and the Texas-Gulf employes the O.W.I.U.-C.I.O. petitioned the NLRB for an election in a single division. After reviewing the long record of independent union bargaining on an area-wide basis, the board ruled that the historical bargaining units were still "appropriate." The Mid-Continent election was deferred about 7 months by O.W.I.U.-C.I.O. request.

It was emphasized the election applied only to Shell Pipe Line Corp. employes and not to Shell Oil Co. employes.

Heltzel Resigns Post With Stanolind Pipe Line Co.

William G. Heltzel resigned as vice president of Stanolind Pipe Line Co., effective August 1, to engage in practice as a consulting engineer in pipeline transportation and crude-oil pipe lines. He has been continuously employed by the organizations operating the Stanolind system since he started as an engineer in 1922. In 1930 he became general superintendent and was promoted to vice president in 1940.

In addition to his work as an executive and engineer, Heltzel has contributed to the advancement of pipeline techniques through several published studies of various phases of operations. These included fluid-flow and friction (1930) and equivalent lengths of crude-oil pipe lines (1934) published in The Oil and Gas Journal. His discussions have also featured trends covering practices which have

been subsequently widely adopted, such as the coating of lines for their entire length, higher operating pressures, longer distances between pump stations, the application of superchargers, the use of large-diameter pipe principles, and the modernization of existing systems.

For several years Heltzel served as chairman of the Petroleum Division of the American Society of Mechanical Engineers, a period marked by expanding activities on the part of the society in petroleum operations. Among notable accomplishments was the development of semiautomatic pump-station design as a project undertaken jointly by engineers in the industry.

Stanpac Line to Reduce Pull on Rio Vista Field

LOS ANGELES.—With the return of the Stanpac pipe line to gas service, the operators at the Rio Vista field, California's major gas field, are looking forward to reducing the gas pull on this reservoir during the summer period.

As the line was converted to crude oil service during the war, the Rio Vista field was continued in operation to make up the deficit resulting from conversion of the main trunk from San Joaquin Valley fields, instead of shutting down during the summer months as is the custom due to conservation regulations.

The Stanpac line is owned by Pacific Gas & Electric Co., Public Service Co., and Standard Oil Co. of California, and was switched to crude because of tanker shortages and submarine threats.

April Motor Fuel Movements Increase

WASHINGTON. — April pipe - line shipments of motor fuel increased 13.4 per cent over the previous month, according to the Bureau of Mines' monthly petroleum statement. Total deliveries were 18,293,000 bbl. in April, compared with 16,128,000 bbl. in March. April 1945 deliveries were 28,477,000 bbl.

With wartime movements by pipe line ended, deliveries for the period of January through April 1946 fell off 42,492,000 bbl., or 40.2 per cent under the same period in 1945.

Stocks of motor fuel in lines and working tanks at the end of April had decreased 8.2 per cent from the previous month. April stocks were reported at 9,298,000 bbl., compared with 10,130,000 bbl. at the end of March. April 1945 stocks were 13,-254,000 bbl.

June Pipe-Line Tax Receipts Show Drop

WASHINGTON. — Pipe-line transportation-tax collections totaled $1,-081,778 in June, against $1,228,920 in May, a decrease of 12 per cent, according to Bureau of Internal Revenue figures. June collections a year ago were $1,305,587—17 per cent over the June 1946 receipts.

Pennsylvania Gas Line Now Nearing Completion

OIL CITY, Pa.—The new 8-mile, 5-in. gas pipe line from the Tallyho gas field to Kane, Pa., is nearing completion, officials of Kane Gas Co. said last week, and will assure the city of adequate fuel supplies in the future.

In addition to an outlet for the field, the line itself will serve as a reservoir for a comparatively large quantity of gas for the city needs.

New Terminal Opened

CHARLESTON, S. C.—Ceremonies opening the first bulk-plant marine terminal of Socony-Vacuum Oil Co., Inc., in southeastern United States were held here recently. Situated on Cooper River, the new terminal has four storage tanks of 11,000,000 gal. storage capacity.

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STATISTICS and

WEEKLY WELL COMPLETIONS... WEEK ENDED AUGUST 3, 1946

	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1946				
	Comp.	Oil	Gas	Dry	Footage	1946	1945	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	30	15	0	†15	40,360	924	823	0	0	0	0	0	0	0	0	0	0
Pennsylvania	73	37	8	‡28	116,298	2,339	2,391	0	0	0	0	0	0	0	0	0	0
West Virginia	17	3	11	3	46,758	413	482	0	0	0	0	0	0	0	0	0	0
Ohio	27	9	9	9	64,765	707	539	0	0	0	1	1	2	0	10	22	34
Indiana	6	0	1	5	13,991	208	115	0	0	0	0	0	2	0	0	11	13
Kentucky	11	1	7	3	24,561	290	282	0	0	0	0	0	2	0	0	20	22
Illinois	42	24	0	18	99,143	1,283	999	0	0	0	8	8	24	0	0	236	260
Michigan	19	6	2	11	41,154	469	452	2	0	0	8	10	17	0	5	154	176
Kansas	36	24	1	*11	116,418	1,152	984	1	0	0	3	4	17	0	0	146	163
Nebr., Mo., Iowa	2	0	0	2	2,100	11	12	0	0	0	2	2	0	0	0	7	7
Oklahoma	78	40	12	26	249,033	1,504	1,425	3	0	1	7	11	48	0	26	183	257
Texas	130	73	15	42	575,913	4,684	4,247	7	1	0	17	25	115	19	17	752	903
North Central	44	16	1	27	132,096	1,689	1,270	3	0	0	8	11	33	0	2	310	345
West	43	36	0	7	204,018	997	1,086	0	0	0	6	6	30	0	1	103	134
Panhandle	2	1	1	0	5,371	195	332	0	0	0	0	0	0	0	0	5	5
Eastern	12	4	7	1	70,875	417	195	0	0	0	1	1	10	0	1	53	64
Gulf Coast	20	13	5	2	134,652	1,033	968	2	1	0	0	3	27	17	7	149	200
Southwest	9	3	1	5	28,901	353	396	2	0	0	2	4	15	2	6	132	155
Louisiana	22	12	0	10	140,292	765	597	1	0	0	5	6	33	6	4	102	145
Northern	12	8	0	4	42,599	419	213	0	0	0	1	1	6	0	0	54	60
Southern	10	4	0	6	97,693	346	384	1	0	0	4	5	27	6	4	48	85
Arkansas	3	1	0	2	14,573	105	105	0	0	0	2	2	4	0	0	23	27
Mississippi	1	1	0	0	8,691	147	210	0	0	0	0	0	1	0	1	40	42
Southeastern States	1	0	0	1	4,978	26	37	0	0	0	0	0	1	0	0	21	22
Montana	11	5	1	5	23,697	177	183	0	0	0	3	3	9	0	1	21	31
Wyoming	2	2	0	0	8,040	98	117	0	0	0	0	0	10	0	3	25	38
Colorado-Utah	3	3	0	0	18,799	80	22	1	0	0	0	1	4	0	0	10	14
New Mexico	10	7	1	2	39,774	216	262	0	0	0	1	1	3	0	0	24	27
California	27	16	1	10	146,820	1,058	1,390	1	0	0	10	11	6	0	3	134	143
Total United States	551	279	69	203	1,796,158	16,656	15,674	16	1	1	67	85	298	25	70	1,931	2,324
Total previous week	598	309	76	213	1,698,088	16,105	15,085	8	1	2	76	87	282	24	69	1,864	2,239
Total Aug. 4, 1945	589	276	75	238	1,928,716			6	1	4	88	99	312	17	83	2,017	2,429

Service wells included: *1, †15, ‡27.

MARKET QUOTATIONS

GRAVITY SCHEDULES

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Tex.*
18-18.9	$1.17	....	....	....
19-19.9	1.21	....	$1.41	$1.05
20-20.9	1.24	$1.20	1.43	1.07
21-21.9	1.28	1.22	1.45	1.09
22-22.9	1.32	1.24	1.47	1.11
23-23.9	1.35	1.26	1.49	1.13
24-24.9	1.39	1.28	1.51	1.15
25-25.9	1.43	1.30	1.53	1.17
26-26.9	1.46	1.32	1.55	1.19
27-27.9	1.50	1.34	1.57	1.21
28-28.9	1.54	1.36	1.59	1.23
29-29.9	1.57	1.38	1.61	1.25
30-30.9	1.61	1.40	1.63	1.27
31-31.9	....	1.42	1.65	1.29
32-32.9	....	1.44	1.67	1.31
33-33.9	....	1.46	1.69	1.33
34-34.9	....	1.48	1.71	1.35
35-35.9	....	1.50	1.73	1.37
36-36.9	....	1.52	1.75	1.39
37-37.9	....	1.54	1.77	1.41
38-38.9	....	1.56	1.79	1.43
39-39.9	....	1.58	1.81	1.45
40 and above	....	1.60	1.83	1.47

*Includes Lea County, New Mexico.

(Quotations shown here are f.o.b. plant in tank cars and in cents per gal. as of last Monday. Crude prices reflect latest 25-cent advance except in California and Pennsylvania where no increase had been made as of Monday morning, July 29.)

REFINERY GASOLINE

Octane (A.S.T.M.)	78-78½†	73-75
Mid-Continent*	7.750	6.750-7.000
Tex. Gulf Coast	7.250	6.500-6.750
New York Harbor	8.600	7.700
California		7.000-7.875

*Basic Oklahoma Group 3. †1939 C.F. R. (research method).

NATURAL GASOLINE

Grades—	26-70	18-55
Oklahoma (Group 3)	4.000	4.800
N. Texas (f.o.b. plant)	3.500	4.200
N. Louisiana (f.o.b. plant)	3.750	4.500
California	5.875	6.500

CRUDE-OIL PRICES

Representative posted schedules per bbl.

East Texas	$1.60
Kettleman Hills, California*	1.69
Beauregard Parish	1.55
Illinois Basin	1.72
Pecos County, Texas	1.30
Bradford, Pennsylvania	3.35
Eastern Ill., and Western Ind.	1.57

Note: Exclusive of subsidy.
*For 37-37.9 gravity.

A.P.I. REFINERY REPORT

Week ended July 27, 1946
(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks— Gasoline	Distillate	Residual
East Coast	758	22,774	14,215	9,531
Appalachian	144	3,101	575	363
Ill., Ind., Ky.	798	16,539	6,483	4,365
Okla., Kan., Mo.	382	7,813	2,663	1,368
Inland Tex.	226	2,625	491	753
Tex. Gulf Cst.	1,217	13,708	6,989	4,954
La. Gulf Cst.	357	4,267	2,241	1,434
N. La., Ark.	61	1,898	436	152
Rocky Mt.	130	1,677	526	819
California	823	14,224	9,697	25,778
Total 7-27-46	4,896	88,626	44,316	49,517
Total 7-20-46	4,826	89,326	42,611	49,177
Total 7-28-45	5,012	86,181	35,929	42,760

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended—	Bbl. of crude*
July 27, 1946	223,756,000
July 20, 1946	222,740,000
July 28, 1945	218,507,000

*Excludes unrefinable Calif. stocks.

TRENDS

DAILY AVERAGE PRODUCTION FOR WEEK

	Aug. 3 crude oil	B. of M. July demand	July 27 crude oil
Alabama	1,200	950	1,150
Arkansas	78,950	78,000	78,900
California	877,500	844,000	872,750
Colorado	32,450	28,000	32,750
Eastern	61,950	64,000	61,600
Florida	200	250	200
Illinois	210,000	210,000	209,800
Indiana	18,300	19,000	18,900
Kansas	264,150	260,000	271,450
Kentucky	30,850	31,000	31,200
Louisiana	392,300	380,000	391,500
North Louisiana	91,000	.....	90,850
South Louisiana	301,300	.....	300,650
Michigan	45,700	47,000	45,900
Mississippi	62,750	60,000	64,900
Montana	25,800	22,000	25,800
Nebraska	750	800	800
New Mexico	100,850	97,000	98,150
Oklahoma	381,100	384,000	383,650
Texas	2,196,250	2,110,000	2,227,550
District 1 (Southwest)	19,500	.....	19,500
District 2 (Southwest)	157,150	.....	158,100
District 4 (Southwest)	226,900	.....	228,000
District 3 (Gulf Coast)	504,100	.....	511,350
District 5 (Eastern)	43,800	.....	44,150
District 6 (Eastern)	107,150	.....	107,800
East Texas Field	315,600	.....	315,000
District 7C (West)	28,100	.....	28,000
District 8 (West)	546,700	.....	569,150
District 7B (W. Central)	32,100	.....	32,000
District 9 (N. Central)	130,100	.....	129,300
District 10 (Panhandle)	85,050	.....	85,200
Wyoming	110,950	112,000	111,500
Total United States	*4,892,000	4,748,000	4,928,450

Change from prev. wk., down 36,450

Total production January 1-August 3 ..... †1,035,494,800

Same period last year (crude, plus condensate) 1,035,548,200 bbl.

*Not incl. 21,200 bbl. condensate. †Incl. 5,358,800 bbl. condensate.

CRUDE-OIL STOCKS 223,756,000 bbl. as of July 27—up 1,016,000 bbl. One year ago 218,507,000 bbl.

GASOLINE STOCKS 88,626,000 bbl. as of July 27—down 700,000 bbl. One year ago 86,008,000 bbl.

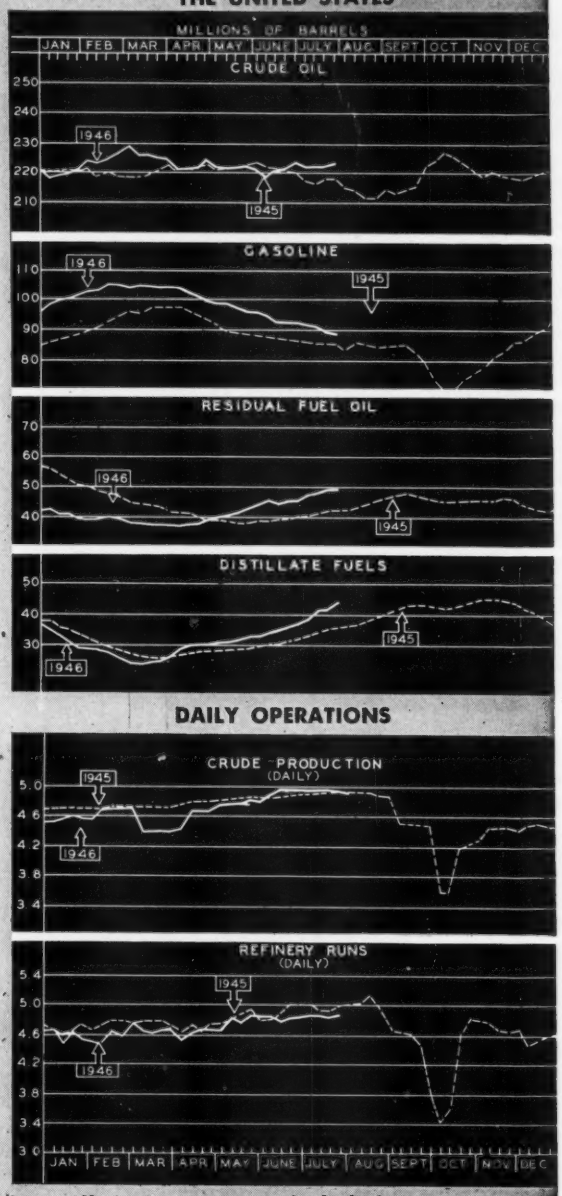
RESIDUAL FUEL-OIL STOCKS 49,517,000 bbl. as of July 27—up 340,000 bbl. One year ago 42,283,000 bbl.

GAS OIL AND DISTILLATE STOCKS 44,316,000 bbl. as of July 27—up 1,705,000 bbl. One year ago 36,071,000 bbl.

CRUDE-OIL PRODUCTION 4,892,000 bbl. as of August 3—down 36,450 bbl. One year ago 4,919,600 bbl.

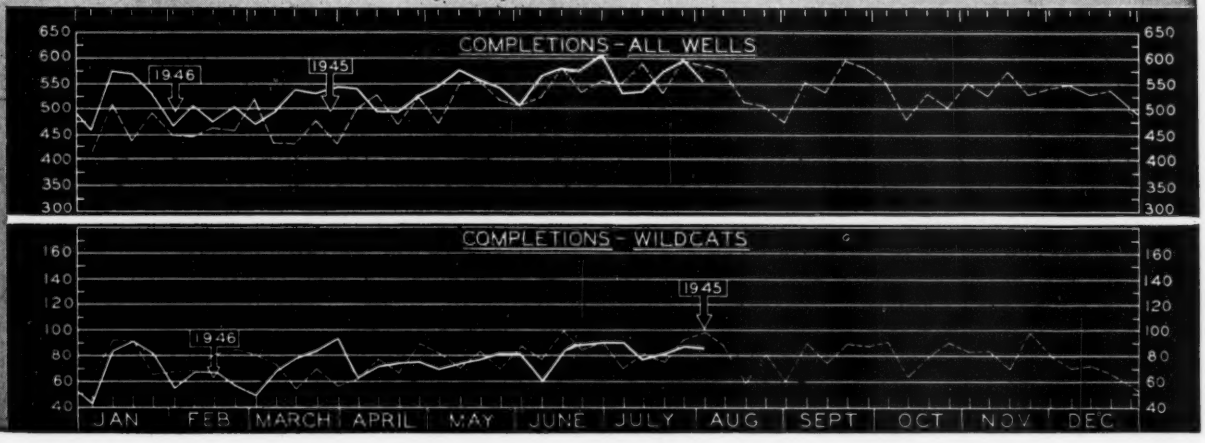
REFINERY RUNS 4,896,000 bbl. daily week ended July 27—up 70,000 bbl. One year ago 4,996,000 bbl.

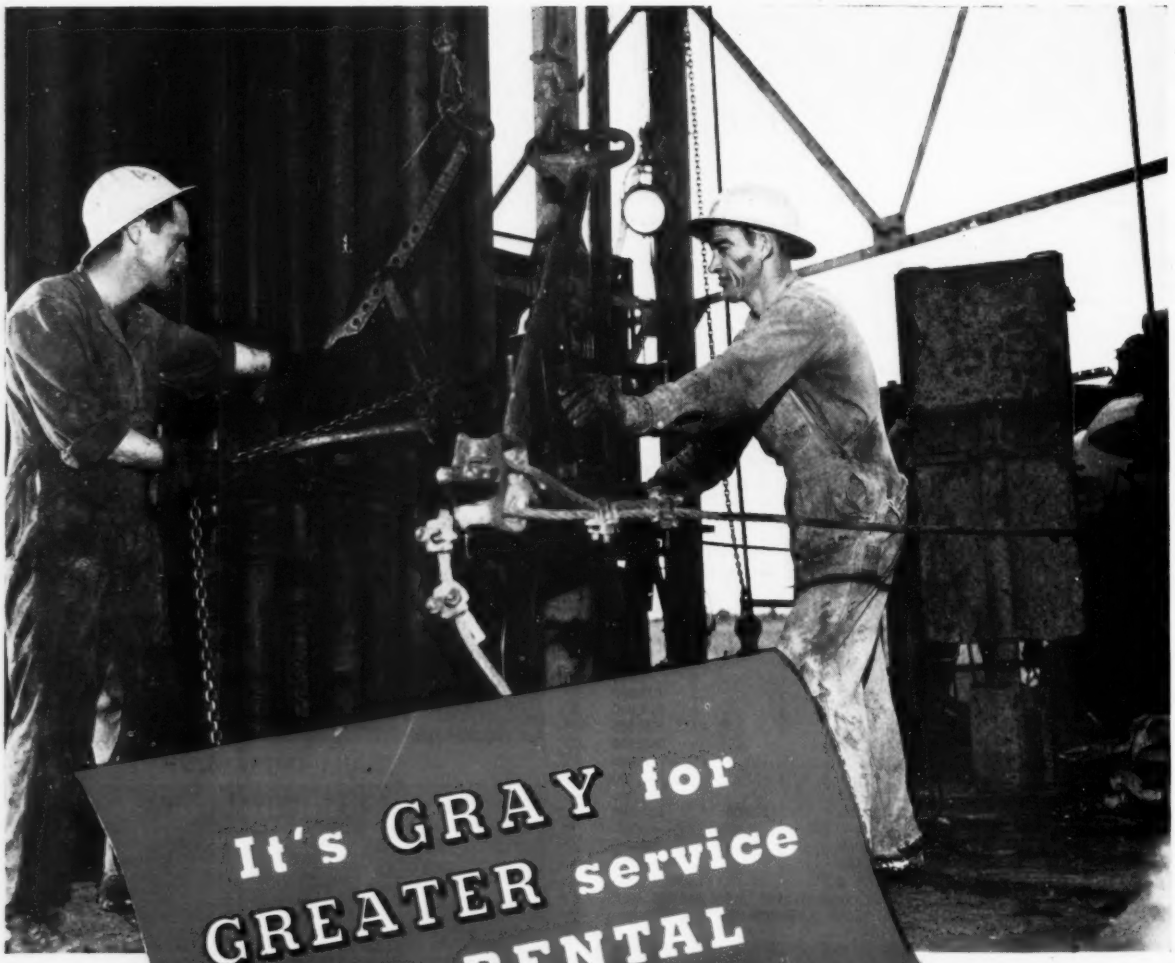
OIL STOCKS IN THE UNITED STATES



DAILY OPERATIONS

Solid line charts weekly completions, service wells in Eastern area included





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Exploration and Drilling

Industry's Biggest Drilling Program

THE industry is well under way on the greatest wildcatting and drilling campaign in its history, and the general 25-cent crude price increase will certainly not slow it down. Replies to The Oil and Gas Journal's questionnaire for the Mid-Year Review (see issue of July 27, pp. 140-141) on projected drilling operations for the last half of 1946 showed that there would be a substantial increase in wildcatting and no slackening in total drilling during the last half of 1946.

Questions keep recurring, however, as to why there should be idle rigs in the face of such an active drilling program. Investigation reveals that there are several good reasons for the seeming paradox of idle rigs along with a drilling program that exceeds the wartime peak rates.

One reason is that a substantial number of new rigs have been delivered and put into service. On an average, these rigs will drill considerably more hole per day than the rigs that have been stacked or junked. A large number of rigs have had important replacements, such as new engines, pumps, or transmissions, or combinations of these. In many cases the footage per day record of these rigs has gone up materially.

An item of no mean importance, according to many contractors, is the increased efficiency resulting from better drilling crews. With the return of more experienced and younger men from the armed services, the efficiency of the whole crew is stepped up; with results showing up in more time on bottom, day after day.

With repair and replacement parts available much more freely, better maintenance, including minor overhauls of rigs between jobs, is being practiced. If repair parts are needed while on location, the toolpusher can usually locate them nearby and have the rig making hole again in a matter of hours. During the war, it often took several days to find and get repair parts.

Still another factor of some importance, is the decrease in idle rig time during periods when outside service units, such as electric logging, cementing, acidizing, or gun perforating crews are working. All of these service units have better manpower, newer and better maintained equipment, and get their jobs done more quickly.

The companies have more geologists and petroleum engineers back on the job, available for closer supervision of individual wells. This means less time lost in making decisions such as where to set pipe; where to cement; where to perforate, and all the other details of completion.

Although the work of outside service units and the operators' geologists and engineers is largely beyond the drilling contractor's control; it either adds to or subtracts from the time a rig is on any given location. The current trend is mostly toward subtracting from total rig time on location.

Shortage of pipe is a fairly serious item in some cases. There are good, modern rigs idle, which operators would put to work immediately, if they had, or could count definitely on getting, enough pipe of the right sizes. In some areas, particularly for deep holes, operators will not contract for a well until all the pipe is on hand. This factor should gradually ease up, and as it does, there will be fewer and fewer first-class rigs idle.

EASTERN TEXAS

Cherokee County Test Has Show in Woodbine

DALLAS.—Delta Drilling Co. and W. W. Wise 1 Huggins, Jordan Survey, wildcat 7 miles southwest of Rusk and south of the old Rusk pool in Cherokee County, cored from 5,101-20 ft. and recovered 6 ft. of chalk and 1 ft. of Woodbine sand showing oil. On a 7-minute drill-stem test from 5,104-20 ft., using ¼-in. chokes, it sprayed oil and recovered 990 ft. of oil and 60 ft. of drilling mud. Electrical survey was run. Casing was being set for open-hole completion. Standard Oil Co. of Texas will drill a deep wildcat in western Cherokee County, 5 miles southeast of Ironton. It is 1 New Birmingham Development Co. and is located in the northwest corner of the G. E. Looney Survey.

The Manziel pool of Wood County has been given its fifth pay horizon at Rogers Lack and Reagan J. Carraway 1-A J. M. Moore Survey. The well made 15 bbl. of pipe-line oil hourly from the sub-Clarksville through 120 perforations from 4,146-66 ft. The test was drilled to 6,414 ft. in the Paluxy, topped at 6,382 ft. Delta et al 1 B. J. Houston, A. L. Martin Survey, wildcat at Martin's Mill in Van Zandt County, topped the Paluxy at 6,690 ft. There have been no shows. It was drilling below 6,728 ft. Elevation is 477 ft. Humble Oil & Refining Co. 1 Hale, Ables Survey, 1 mile of Kemp, Kaufman County deep test, cored Woodbine sand from 3,018-25 ft. and 3,345-63 ft. and showed water.

Carthage field, Panola County, had seven completions this week and Opelika field, Henderson County, and Merigale and Hawkins fields, Wood County, each had one. Hawkins field had five locations and Smithland field, Marion County, had two. Carthage field has 32 drilling wells; Hawkins field 19; Sand Flat and Mt. Sylvan fields, Smith County, New Hope field, Franklin County, and Manziel and Waskom fields, Wood County, each had four.

EASTERN TEXAS WILDCAT FAILURE

Angelina County: R. G. Walker 1 Angelina Hardwood Co., R. K. Goodloe Sur., 5½ mi. NE Zavala, elev. 141 ft., dry in Wilcox, TD 3,075 ft.

PERMIAN BASIN

Condensate Show in NE Crockett County Test

MIDLAND.—Stanolind Oil & Gas Co. 1-GG University, Section 12, Block 39, University Land, Ellenburger prospect 24 miles northeast of the Todd Deep pool of northeastern Crockett County, ran a 17-minute drill-stem test from 7,977-8,005 ft. The well recovered an estimated 250 ft. of water-white distillate along with 6,000,000 to 8,000,000 cu. ft. of gas. On a second test from 8,002-27 ft. there was gas to the surface in 6 minutes, rated at 280,000 cu. ft. daily. Recovery was 5 ft. of mud with a slight show of distillate. Operator will cut two cores from 8,027 ft. and run another drill-stem test.

Skelly Oil Co. 1 D. C. Huddleston, Section 11, Block 19, T&P Survey, Fisher County discovery 8 miles northwest of Trent and the extreme southeastern corner of the county, took a 3-hour drill-stem test in the Palo Pinto from 4,377-4,405 ft. There was gas in 2 minutes, estimated at 300,000 cu. ft. daily and oil in 47 minutes. It flowed into pits at the estimated rate of 20 bbl. hourly.

Ralph Lowe 1 Sealy-Smith Foundation, Section 71, Block A, G&MMB&A Survey, wildcat 3 miles west of the North Monahan pool, Winkler County, showed salt water in the San Andres and upper Glorietta. On a 60-minute drill-stem test of the Holt from 5,220-80 ft., gas came to the surface in 4 minutes, estimated at 350,000 cu. ft. daily. The well flowed oil and mud in 35 minutes and flowed at an estimated rate of 20 bbl. of fluid hourly. Stanolind et al 35-A Hendrick, Section 33, Block 26, Public School Lands, 3½ miles west of Kermit, Winkler County, is the deepest drilling operation in West Texas. It has been drilled to 13,400 ft. Tentative top of the Ellenburger is 13,895 ft. A core will be cut and a drill-stem test taken.

The Texas Co. 1-P State, Section 15, Block 12, University Lands, Andrews County wildcat northwest of the Martin pool, and 6 miles north of the Bedford pool, drilled to 8,404 ft. and plugged back to 7,318 ft. It was perforated from 7,170-7,250

ft. in the Tubb section of the Permian. The test was acidized with 11,000 gal. of acid and flowed 44 bbl. of oil in 5 hours and died.

Cities Service Oil Co. 1 J. E. Parker, Section 20, Block 44, T-2-S, T&P Survey, wildcat ½ mile west of the Harper pool in Ector County, perforated with 15 shots from 12,474-480 ft. Drill-stem test was unsuccessful when packer failed. Operator will make another attempt. Stanolind 1 Eva B. Kayser, Section 34, Block 43, T-2-S, T&P Survey, 1¼ miles west of the South Cowden pool, Ector County, was drilling below 12,889 ft. in lime.

TXL-Ellenburger field, Ector County, and Sharon Ridge field, Scurry County, had five completions each this week and Fullerton field, Andrews County, and Welch field, Dawson County, each had three. Slaughter field, Cochran and Hockley counties, had six locations, Fullerton and TXL fields each had four and Keystone Colby field, Winkler County, had three. TXL field has 36 drilling wells; Fullerton field 30; Keystone-Ellenburger field, Winkler County, and Todd Deep field, Crockett County, six each, and Keystone-Holt field, Winkler County, and North Goldsmith field, Ector County, each five.

WEST TEXAS WILDCAT FAILURES

Andrews County: Texas Gulf Prod. Co. 1 University Lse. No. 3, Sec. 17, Blk. 9, University lands, 3 mi. S Fuhrman pool, elev. 3,193 ft., Yates 3,020 ft., Holt 5,570 ft., dry, TD 5,712 ft.

Concho County: Northern Ord., Inc. 1 J. H. Stansbury, Sec. 1779, Blk. 72, L. °G. Gleissner, 6 mi. NE Eden, elev. 1,924 ft., Ellenburger 3,266 ft., Hickory 3,718 ft., dry, TD 3,743 ft.

Crockett County: Ben Banner 1 Shannon Est., Leag. 1, Archer CSL, 1 mi. E Olson pool, elev. 2,505 ft., dry, TD 2,310 ft.

Garza County: Northern Ord. 1 Mrs. Eliza Walker, Sec. 45, Blk. 6, H&GN Sur., 2½ mi. W Justiceburg, elev. 2,265 ft., San Andres 2,040 ft., Clear Fork 3,205 ft., dry, TD 3,522 ft.

Pecos County: R. B. Rawlins 1 H. Cordz, Sec. 101, Blk. 8, H&GN Sur., 2 mi. NW Pecos Valley pool, elev. 2,439 ft., dry, TD 2,040 ft.

Ward County: G. H. Chisum et al 1 University, Sec. 27, Blk. 18, Univ. lands, 14 mi. NW Pyote, elev. 2,829 ft., Delaware 5,192 ft., dry, TD 5,343 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—Pure Oil Co. 1 Federal, 31-3n-28e, DeBaca County wildcat 13 miles east of Fort Sumner, topped the Glorietta at 2,110 ft. and the Abo at 4,005 ft. It was drilling below 4,480 ft. DeKalb Agricultural Association, Inc., 1 Nellie T. Lewis, 13-10s-25e, Chaves County wildcat 15 miles northeast of Roswell, plugged back to 1,300 ft. to test light shows. The test went into the granite at 5,630 ft. and drilled to a total depth of 5,650 ft.

C. W. Chancellor 1 State, 27-17s-33e, Lea County wildcat 2 miles east of the Vacuum field, showed for approximately 10 to 12 bbl. of oil per day natural from 4,540-55 ft. It was drilling below 4,555 ft. in lime while preparations were being made for a test. Magnolia Petroleum 12 Argo-Brunson, 9-22s-37e, on the southeast side of the Brunson (Ellenburger) field, Lea County, which found the Ellenburger barren in drilling to 7,571 ft. in granite, flowed 106.25 bbl. of oil in 24 hours from the lower Permian. The gage was through a ¾-in. choke. Gas-oil ratio was 563 to 1. The well plugged back to 6,671 ft., perforated casing from 6,450-6,540 ft. and was treated with 3,000 gal. of acid.

Drinkard field, Lea County, had two completions and Caprock field, Chaves County, and West Roberts field, Lea County, each had one. Grayburg-Jackson and Russell fields, Eddy County, each had two locations and Drinkard and West Eunice fields, Lea County, each had one. Paddock field, Lea County, has 17 drilling wells; Drinkard field, 16; Grayburg-Jackson field, 12; Square Lakes field, Eddy County, 10, and Brunson field, Lea County, 5.

SOUTHEASTERN NEW MEXICO WILDCAT FAILURE

Eddy County: Malco Refineries, Inc. 1 Bynum, 8-20s-25e, 10 mi. SW Lakewood, elev. 3,492 ft., dry, TD 1,318 ft.

SOUTHWEST TEXAS

New Pool Opened In Starr County

CORPUS CHRISTI.—New oil production has been opened in Starr County by W. D. Kennard 1 M. M. Garcia. Drilled to a total depth of 3,541 ft., this test flowed a potential gage of 102 bbl. of 41° gravity oil per day through a ⅛-in. choke, with gas-oil ratio 300 cu. ft., no water, tubing pressure 460 lb., casing 1,280 lb. Production is through perforations at 3,500-04 ft. This new discovery is located in Share 12, Porcion 90, near the Boyle-Rincon fields.

Stanolind Oil & Gas Co. 1 L. A. Reagan, new oil discovery located ¾ mile southwest of the gas-condensate discovery well at Oakville-Wilcox field in Live Oak County, flowed on potential gage 30 bbl. of 38° gravity oil per day through a ⅛-in. choke, with gas-oil ratio 17,000 cu. ft., tubing pressure 1,375 lb., casing pressure 1,825 lb. Production is from open hole at 6,738-38½ ft. Total depth is 6.738½ ft., with the 7-in. casing set to 6,738 ft. in the Slick sand, topped at 6,717 ft. On initial gage this well flowed 92 bbl. per day through a ⅛-in. choke, with gas-oil ratio only 2,830 to 1, but the ratio slowly increased to the present figure.

Hiawatha Oil & Gas Co. 41 Southland Life Insurance Co., new oil discovery just west of Southland field production, in Duval County, gaged an estimated 50 bbl. per day of 38° gravity oil through a ⅛-in. choke. Gas-oil ratio 6,900 cu. ft., tubing pressure 1,140 lb., and casing pressure 1,500 lb. Production is through perforations at 3,883-87 ft., in the Cole sand, at a level higher than any previous production in the Southland field, and it is separated from the field by dry holes. Total depth is 5,510 ft. with 5½-in. casing set to 5,425 ft.

Sun Oil Co. 1 M. L. Patton, wildcat 6 miles west of Goliad, in Goliad County, flowed approximately 200 of fluid per day (half oil, half water) on production test through perforations at 10,680-85 ft. Well is now shut down for orders at total depth of 10,765 ft. Sands showing oil were indicated by electrical log at 10,670-90 ft., 10,695-705 ft., and 10,740-50 ft. The 5½-in. casing was set on bottom. This well is approximately 2 miles north of Sun 2 Thompson, deep discovery which blew out from below 11,000-ft. level and was completed for a high gas-oil ratio well, no water.

Three new fields have been named by the Oil Field Nomenclature Committee of the South Texas Geological Society, as follows: "Ike" for field discovered by Continental 1-B Albert West, Jamison Survey, Live Oak County. "Fashing" for field discovered by H. R. Smith and Skinner & Eddy 1 G. F. Wiegang, A. S. Donovan Survey 145, Atascosa County. "Beasley" for field discovered by Southern Minerals 1 J. R. Beasley, V. Juarez Survey, San Patricio County.

Of the 47 new locations reported this week, 13 were wildcats. Three located in Duval, two each in Atascosa and Medina, and one each in Bee, Gonzales, Nueces, Travis, Webb and Zapata counties. Duval and Jim Wells counties received the greatest activity with six new locations reported for each county, with Refugio next with five. Jim Wells received four completions while Refugio and Webb each received three. Three new oil pools and one condensate pool were opened this week, being one each in Guadalupe, Live Oak, San Patricio and Starr counties. Two dry wildcats were shown, one each in Webb and Williamson counties.

SOUTHWEST TEXAS SUCCESSFUL WILDCATS

Guadalupe County: New oil pool discovery—United North & South Dev. Co. 1 J. F. Webb, James Hodges Sur., 4½ mi. SW of Luling, 2 mi. SW of Day field, TD 2,525 ft., perf. 100 holes 2,421-53 ft. and 48 holes 2,584-2,505 ft., PT 175 bbl. per day net oil on pump, no gas, 50 per cent water.

Live Oak County: New oil pool—Oakville-Wilcox field, Jas. McGloin Sur., ¾ mi. SW of gas-condensate discovery well, top pay 6,717 ft., TD 6,738½ ft., open hole 6,738-38½ ft., no shots, PT 30 bbl. oil per day through a ⅛-in. choke, gas-oil ratio 17,000 to 1, TP 1,375 lb., CP 1,825 lb., gravity 38°, no water.

San Patricio County: New gas-condensate pool, Beasley field—Southern Minerals Corp. 1 John R. and Floy L. Beasley, V. Juarez Sur., approximately 1½ mi. SW of Tynan, near Bee County line, TD 4,999 ft., perf. 4,900-08 ft., PT 10 bbl. per day of condensate through a 9/64-in. choke, no gage on gas, TP 1,400 lb., CP 1,650 lb., shut-in pressure 1,680 lb., no water.

Starr County: New oil pool—W. D. Kennard 1 M. M. Garcia, Block 29, Tract 215, Share 12, Porcion 90, top pay 3,494 ft., TD 3,541 ft., perf. 3,500-04 ft., PT 102 bbl. oil per day through a ⅛-in. choke, gas-oil ratio 300 to 1, TP 460 lb., CP 1,280 lb., gravity 41°, no water.

SOUTHWEST TEXAS WILDCAT FAILURES

Webb County: Newman Bros. Drlg. Co. and Skinner & Eddy Corp. 1 A. M. Bruni, Albercas grant, 6 mi. SW of Bruni, dry, TD 2,284 ft.

Williamson County: H. G. Albert 1 E. W. Stromberg, P. Coursey Sur., 3 mi. SE of Taylor, dry, TD 829 ft.

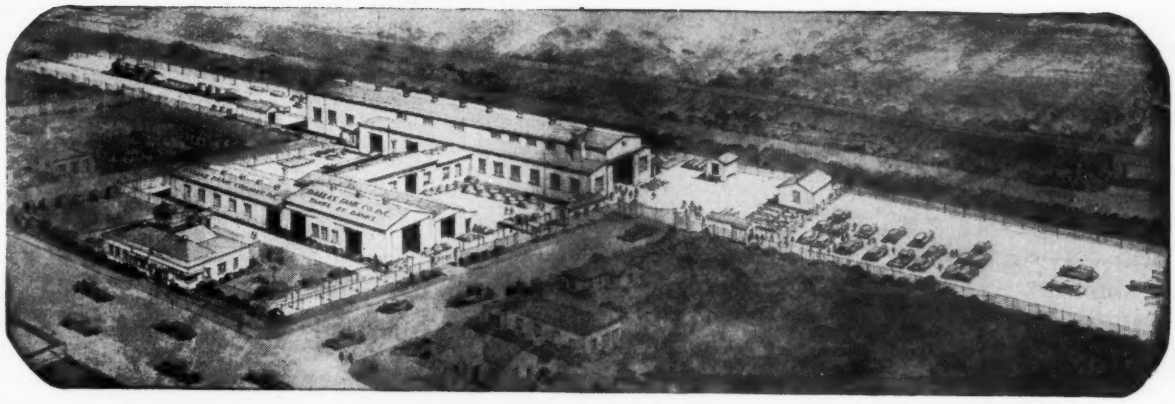
N. CENTRAL TEXAS

Throckmorton County Test Gets Show in Caddo Lime

WICHITA FALLS.—Fred M. Manning, Inc. 1 O. H. Parrott, Section 962, TE&L Survey, wildcat 3 miles northwest of Woodson, Throckmorton County, topped the Caddo lime at 3,895 ft. Lime showing oil was drilled from 3,895-3,905 ft. A 1-hour drill-stem test from 3,895-3,905 ft. returned 1,200 ft. of gas, a show of free oil, 30 ft. of oil-cut mud and 80 ft. of oil and gas-cut mud. On a 20-minute drill-stem test from 3,918-25 ft. it showed gas in 8 minutes and recovered 430 ft. of oil and 20 ft. of oil-cut mud. Casing was being set around 3,895 ft.

G. E. Kadane & Sons 1 Servatius Estate is a new wildcat 5 miles south of Vernon in Wilbarger County. It is 990 ft. from the north line and 330 ft. from the west line of the west half of the southeast quarter of Section 78, Block 14, H&TC Survey. The wildcat is 2½ miles southeast of National Associated Petroleum Co. 1 Schmoker, completed in the Canyon at 3,527 ft. The new test will be drilled 3,300 ft. Sohio-Kadane 1 John Showers, Section 23, Block 13, H&TC Survey, 5,000-ft. wildcat 1½ miles south of Harrold, Wilbarger County, was drilling below 3,874 ft. in shale and shells with no shows reported.

Tom B. Meeders 1 W. B. Fuller, Section 5, Block 1 H&TC Survey, Archer County wildcat 8 miles south of Wichita Falls, recovered 150 ft. of slightly oil-cut mud on a 30-minute drill-stem test from 4,763-87 ft. and was deepening. Bennett & Sorrells 1 Milton, Block 13, Titus County School Land, 6 miles east of Sunset, Montague, was preparing to squeeze off per-



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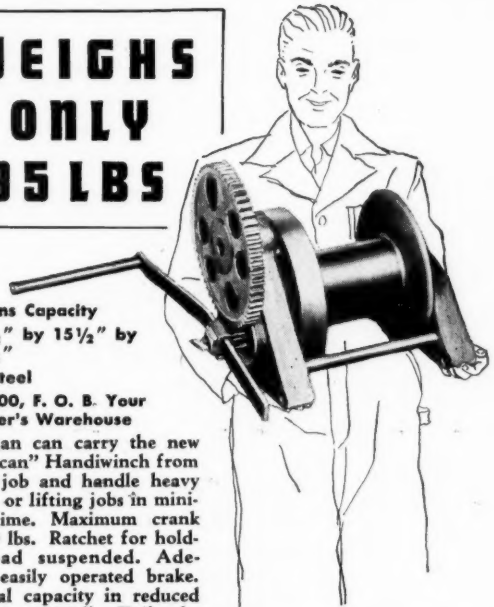

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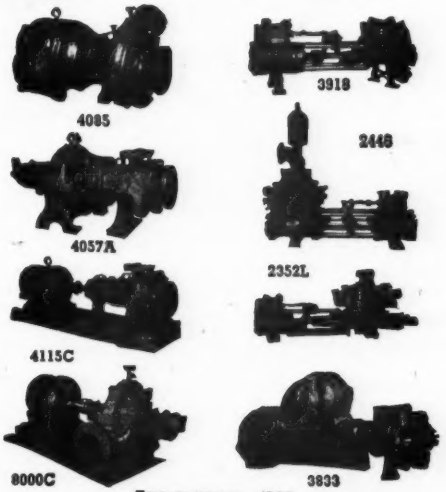

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forations from 6,234-37 ft., which failed to have any shows on test.

Holliday field, Archer County, had four completions this week and Electra field, Wichita County, three. National field, Wilbarger County, had five locations and Rose field, Haskell County, and Holliday field each had two.

In West Central Texas, Lewis Steffins field, Jones County, and Shackelford County Regular field each had two completions and Murphree field, Taylor County, and Sanders field, Shackelford County, one each. Jones County Regular field, Overall field, Coleman County, and Eliasville field, Stephens County, each had one location.

NORTH CENTRAL TEXAS SUCCESSFUL WILDCATS

Grayson County: New oil pool—Texas 2 Hanby, Samuel Stewart Survey A-1069, 10 mi. NW Gordonville, flowed 522 bbl. day natural through ½-in. choke on 2-in. tubing, perf. 1,665-97 ft. Strawn, gravity 39.6°, TD 1,699 ft.

Young County: New oil pool: A. R. Dillard 1 Marietta Killam, Sec. 211, TE&L Sur., 2 mi. S Olney, elev. 1,212 ft., flowed 280 bbl. day through 1-in. choke on 2-in. tubing, perf. 4,945-60 ft. Mississippi. TD 4,965 ft.

New oil pay: R. S. LeSage 2 C. K. Garvey, Sec. 1, A. B. Jamison Sur., Garvey pool, elev. 1,191 ft., pumped 12 bbl. day, perf. 3,640-48 ft. Strawn, gravity 41°, TD 3,648 ft.

NORTH CENTRAL TEXAS WILDCAT FAILURES

Cooke County: Burk Royalty Co. 1 A. McGeorge, Wm. Moore Sur. A-626, 2 mi. SW Woodbine, elev. 834 ft., Ellenburger 4,297 ft., dry, TD 4,355 ft.

Montague County: Burk Royalty Co. 1 J. C. Case, J. Moss Sur., ½ mi. SW Spanish Fort, elev. 834 ft., dry in Canyon, TD 2,108 ft.

Wilbarger County: National Asso. 1 J. E. Lockett, Sec. 27, Blk. 9, H&TC Sur., 6 mi. SW Vernon, elev. 1,292 ft., Canyon 3,580 ft., dry, TD 4,512 ft.

WEST CENTRAL TEXAS WILDCAT FAILURES

Callahan County: Boyd Gillespie 2 Tom Windham, Sec. 145, BBB&C Sur., 3¾ mi. SE Baird, elev. 1,709 ft., dry in Montray, TD 1,168 ft.

Coleman County: W. B. Johnson Drlg. 1 Frank Hudson, Sec. 4, Blk. 1, HT&B Sur., ¾ mi. NW Silver Valley, elev. 1,932 ft., Jennings 3,153 ft., dry, TD 3,485 ft.

Jones County: Humble 1-B Bishop, Sec. 22, Blk. 19, T&P Sur., 6½ mi. SW Noodle, elev. 1,909 ft., Ellenburger 5,394 ft., dry, TD 5,684 ft.

R. R. Traugh 1 Kenney, Sec. 17, Blk. 3, H&TC Sur., 8½ mi. N Lueders, elev. 1,504 ft., dry, TD 3,285 ft.

Stephens County: West Central Drlg. et al 1 Copeland, H&GN Sur. No. 1, 2¼ mi. NE Miles, elev. 1,456 ft., Ellenburger 4,255 ft., dry, TD 4,305 ft.

TEXAS GULF COAST

Amerada Opens New Pool In Matagorda County

HOUSTON.—A new oil pool has been opened in Matagorda County, 3 miles southeast of Blessing townsite by Amerada Petroleum Co. et al 1 Ike Laughlin, in John Holmes Survey. Drilled to a total depth of 11,513 ft., this well gaged a potential flow of 132 bbl. of 47° gravity oil daily through a 9/64-in. choke with 1,250 lb. flowing pressure on the tubing, casing sealed. The 7-in. casing was cemented to 10,105 ft., and production is through 48 perforations at 8,832-46 ft. Gas-oil ratio is 1,982 cu. ft., and no water in the flow. Tests made in the 10,000-ft. level all showed salt water with only slight shows of oil.

A second new oil pool for Matagorda County is assured at Magnolia Petroleum Co. 1 Live Oak Farms, a wildcat test about 2½ miles northeast of Blessing townsite in the J. E. W. Wallace Survey. On the first 13-hour test through perforations at 8,450-56 ft., using a ⅛-in. choke, the well flowed 131 bbl. of 41° gravity oil, with 1,500 lb. flowing pressure on the tubing and a gas-oil ratio of 838 cu. ft. It gaged 110,000 cu. ft. of gas with the oil flow. Total depth is 11,157 ft., where drill pipe stuck; plugged back depth is 8,468 ft. Operators are running tubing for completion.

General Crude Oil 1 Phoenix Development Co., on the southeast flank of the Hull field, Liberty County, in Jesse Devore League, gaged 50 bbl. of 32° gravity oil in 24 hours through a 10/64-in. choke, with tubing pressure flowing at 550 lb. Total depth is 9,016 ft. and the 7-in. casing is cemented to 8,145 ft. Production is through 47 perforations from 7,850-58 ft. Tests at 8,050-58 ft. and 8,039-42 ft. showed salt water.

A new deep sand producer at Lovell Lake field in Jefferson County is Humble Oil & Refining Co. 40 Jefferson Land Co., in C. Hillebrandt Survey. Drilled to a total depth of 9,855 ft., with 7-in. pipe cemented to 9,128 ft., well flowed 3,830,000 cu. ft. of gas and 91 bbl. of 48° gravity condensate daily through a 9/64-in. choke with gas-oil ratio being 42,000 cu. ft. Pressures are high with tubing flowing pressure 6,350 lb., and 6,650 lb. pressure shut in. Production is through 60 perforations at 9,030-40 ft.

Gas production at Needville field in Fort Bend County has been extended 2,650 ft. by W. L. Goldston 1 T. J. Hudgins et al, in H&TC Survey, Abstract 224, Section 39. It flowed dry gas with 2,050 lb. flowing pressure on the tubing, and is shut in now waiting on a potential gage. Total depth is 5,253 ft., with 5½-in. casing cemented at 5,250 ft. Production is through 94 perforations at 5,116-34 ft.

Stanolind Oil & Gas Co. 1 State Land, Tract 2, in the Gulf of Mexico off the southwest flank of High Island field in Galveston County, reports a 24-hour gage of 166 bbl. of 37° gravity oil through a 9/64-in. choke, tubing pressure 750 lb., and a gas gage of 76,000 cu. ft. Production is through perforations at 6,432-34 ft. Total depth is 6,994 ft.

Standard Oil Co. of Texas will start immediately to drill a 12,000-ft. wildcat test in Galveston Bay, approximately 1 mile northeast of production in the Red Fish Reef field, and southeast of production in the Smith's Point field, Chambers County. It

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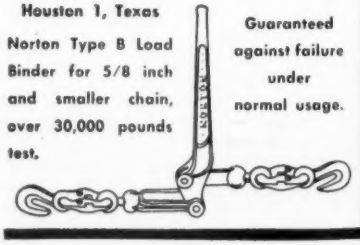


is 1 State Mineral Lease 27,129, Section 201, Galveston Bay.

Fifteen new locations were reported this week of which five are wildcats, two in Chambers, and one each in Fayette, Fort Bend, and Harris counties. Three of the wildcats are projected to 10,000 ft. or deeper. Five of the six completions were producers with one a new pool opener in Matagorda County.

UPPER GULF COAST SUCCESSFUL WILDCAT

Matagorda County: New oil pool—Amerada Petroleum Corp. et al 1 Ike Laughlin, in Jno. Holmes Sur., 3 mi. SE of Blessing, TD 11,513 ft., top sand 8,832 ft., perf. 48 holes 8,832-46 ft., PT 132 bbl. 24 hours through a 9/64-in. choke, gas-oil ratio 1,982 to 1, TP 1,250 lb., 47° gravity, no water.

SOUTH LOUISIANA

Dog Lake Field Gets New Pay at 9,600 Ft.

NEW ORLEANS.—A new deep sand for the Dog Lake field of Terrebonne Parish has been opened by The Texas Co. 12-5 State, on Lease 200, of the Dog Lake Unit, 1-22s-15e. On a potential gage the well flowed 200 bbl. of 37° gravity oil per day through a 1/8-in. choke, with 1,625 lb. pressure, gas-oil ratio 1,138 cu. ft. Total depth is 10,131 ft., and production is through 60 perforations at 9,600-13 ft.

At Bayou Mallet, in Acadia Parish, Union Sulphur Co., Inc., 3 Geo. R. Bradley, 51-7s-1e, on potential gage flowed 66 bbl. daily through a 6/64-in. choke, with 1,375 lb. tubing pressure and a gas-oil ratio of 635 cu. ft., gravity 38°, and no water. Total depth is 8,707 ft.; production is through 32 perforations at 8,528-32 ft.

Production at Bayou de Fleur field in Jefferson Parish, has been extended to the north by the California Co. 1 Brady, Lease 4, Unit 2. On potential gage it flowed 264 bbl. of 37° gravity oil daily through a 9/64-in. choke, tubing pressure 1,725 lb., and gas-oil ratio 850 cu. ft. Production is through 30 perforations at 10,485-490 ft. in oil sands from 10,480-498 ft. Total depth is 10,502 ft. and the 7-in. casing is set at 10,501 ft. Oil showings were found in additional sands at 9,000-08 ft., 9,145-66 ft., and 9,370-85 ft. with gas sands picked up from 9,775-86 ft., 9,925-85 ft., and 10,297-322 ft. Location for 5 E. P. Brady, Lease 4, has been made by California in 68-16s-24e.

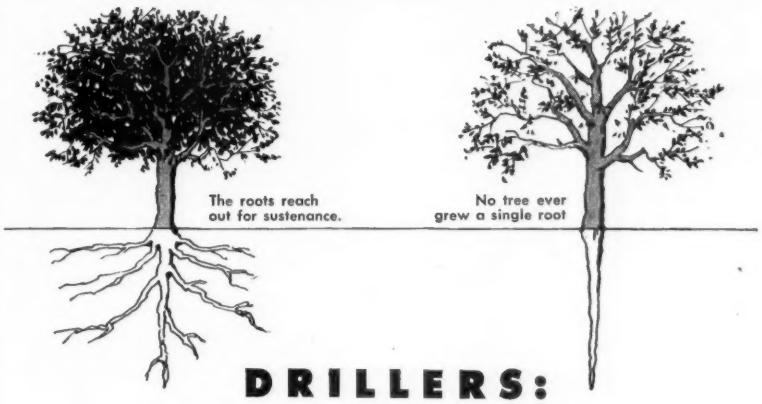
Magnolia Petroleum Co. 1-A Lutcher-Stark, SW NE 18-6s-11w, confirmation wildcat, ½ mile west of the 1 Powell discovery well, Bilbo field, Beauregard Parish, has been spudded and 196 ft. of 13⅜-in. conductor pipe set. Operators are drilling ahead below 1,425 ft. in shale. It is scheduled to be drilled 8,500 ft., through the discovery level.

Fohs Oil Co. and Pilgrim Exploration Co. 1 State Lease 328, Allen Ranch, a wildcat test in the Lake Long area of Lafourche Parish, located in Lake Long, Township 17s-19e, has been plugged with no favorable shows to a total depth of 10,100 ft.

A new 13,000-ft. wildcat test for the Hollywood area of Terrebonne Parish has been rigged up for immediate operations. Atlantic Refining Co. 1 Realty Operators, Tract "B," located in 33-17s-17e, is 3 miles northwest of gas-condensate production in the South Houma field in northeastern Terrebonne Parish.

Four wildcat locations were reported this week, one each in Jefferson Davis, St. Mary, Terrebonne and Vermilion parishes. One new pay was opened in Terrebonne Parish, while three wildcats were dry, one

IT'S THE FOOTAGE OF HOLE IN THE OIL SAND THAT COUNTS



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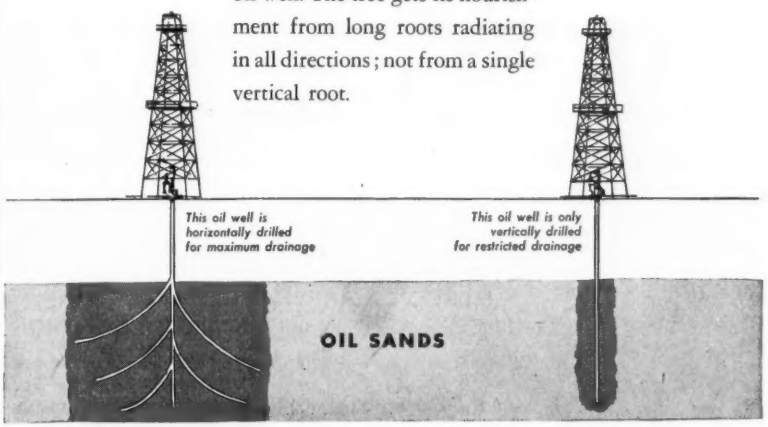
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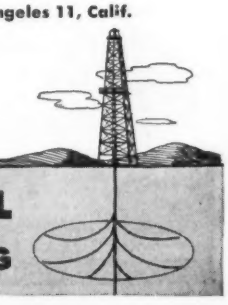

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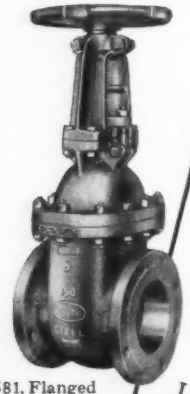

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SOUTH LOUISIANA SUCCESSFUL WILDCATS

Terrebonne Parish: New deep oil pay. Dog Lake field—Texas Co. 12-5 State Lease 200, Dog Lake Unit, in 1-22s-15e, TD 10,131 ft., top sand 9,598 ft., perf. 9,600-13 ft., PT 200 bbl. per day through a ⅛-in. choke, gas-oil ratio 1,138 to 1, TP 1,625 lb., gravity 37°, 0.1 per cent water.

SOUTH LOUISIANA WILDCAT FAILURES

Cameron Parish: Claude F. Morgan 1 Arthur Murphy, Creole area, 31-14s-8w, dry, TD 9,520 ft.

St. Bernard Parish: Sun Oil 1 Robinson Estate, Kenilworth area, 69-13s-14e, dry, TD 12,096 ft.

Texas 2 State - Chandeleur Sound, on State Lease 335, in Chandeleur Sound, dry, TD 11,837 ft.

Terrebonne Parish: Texas 1-A Continental Land & Fur Co., 10-18s-15e, 5½ mi. S of Gibson field, dry, TD 11,649 ft.

MICHIGAN

Michigan Operators Seeking Confirmation of New Field

SAGINAW, Mich.—Michigan oil operators this week are rushing drilling in search of confirmation of the promise of a new southwestern Michigan field held out by discoveries in Casco Township, Allegan County. At least eight new operations were under way, spurred by two wildcat completions within a week that were reported producing approximately 150 bbl. per day each from Traverse limestone formation. Both are in Section 20, where five of the new locations have been established.

The J. E. Hood 1 Taylor came in first, produced 140 bbl. a day, naturally. Within the week Harris Oil Co.-Del Fortney 1 Mestemaker was acid treated and flowed 100 bbl. in 15 hours.

Also operating in the township are R. T. Jones, Ralph M. Perry, Kenneth A. Fox, and J. H. Fitchett, all in Section 20. W. R. Borough, Inc. has two locations in Section 29, and Hood has another in Section 21.

Eight of the week's 10 wildcat completions were dry holes and were drilled in six counties. Of the four oil wells in addition to the Casco producers, two were big wells in the Arenac-Deep River field, one coming in at more than 340 bbl. per hour. The others were a completion in Isabella County's Coldwater field that flowed 181 bbl. in 10 hours and a small producer in Cato Township, Montcalm County. Completions totaled 19—6 oil wells, 2 gas wells, 11 dry holes.

In addition to the eight new Casco locations, 10 others were announced for the week, including 3 more in Deep River, 2 others in Allegan County, 1 each in Gratiot, Isabella, Osceola, Livingston and Van Buren.

MICHIGAN SUCCESSFUL WILDCATS

Allegan County. Casco Township: J. E. Hood 1 Raymond Taylor, NE SW SE 20-1n-16w, flowed 140 bbl. per day, natural, from Traverse limestone, TD 1,103 ft.

Harris Oil Co.-Del Fortney 1 Mestemaker-McKinley, communitized, SE SE SE Sec. 20, flowed 100 bbl. in 15 hours, after acid, from Traverse limestone, TD 1,102 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Monterey Township: Willard Wyse 1 Rutgers, NW NE SW 5-3n-13w, dry, TD 943 ft.

Arenac County, Moffatt Township: Don Rayburn 1 Consumers Power Co., NW

NE NE 13-20n-3e, dry in Dundee, TD 3,025 ft.

Turner Township: Frank E. Roush 1 Edwin Brintnell, NE NE SE 19-20n-6e, dry in Dundee, TD 2,991 ft.

Calhoun County, Burlington Township: Clifford A. Perry 1 Herman Platz, SW NW SE 2-4s-7w, dry in Dundee, TD 1,800 ft.

Kent County, Sparta Township: Oil Producers, Inc. 1 Keith Goodfellow, SW SW SE 28-9n-12w, dry in Dundee, TD 2,763 ft.

St. Clair County, Burtchville Township: Sterling Oil Co.-Gas Producers Co. 1 Nicholas Toodzio, NW NE SE 13-8n-16e, dry, TD 4,267 ft.

Grant Township: William J. Morris 1 W. and A. Golubinski, SE NE NE 27-8n-16e, dry in Dundee, TD 1,218 ft.

Van Buren County, Columbia Township: W. D. Gannett 1 Otto Strauss, SE SE NE 18-1s-15w, dry in Traverse limestone, TD 1,430 ft.

ROCKY MOUNTAIN

Madison Black Oil Found At Black Mountain, Wyo.

DENVER.—A black oil discovery in the Madison lime on the Black Mountain anticline, 25 miles east of Thermopolis and on the southern rim of the Big Horn Basin is reported in Texas Co. 3 State, NW NE SE 36-43n-91w, Washakie County, Wyoming. A discovery on this structure was made in the Tensleep horizon 23 years ago and subsequently five additional wells were drilled to that formation or the overlying Embar and made from 200 to 300 bbl. each per day initial, but the total output dropped to around 200 bbl. per day in a poor market for that grade of oil and the wells have been shut in for several years. When black oil came into greater demand a few years ago, Texas Co. acquired most of the acreage and a year ago started the deep test to the Madison. This well was drilled to 5,012 ft., going into the Cambrian. It was then plugged back to the Madison, topped at 3,815 ft., and is being completed as a producer. The 7-in. was set at 3,936 ft. and perforated opposite the pay. It swabbed 25 bbl. of 22.2° oil and 5 bbl. of water per hour while cleaning up was still in progress. The well also had good porosity in the Embar and Tensleep. It is estimated conservatively that between 600 and 700 acres will be productive in the Madison. The Madison discovery had the top of the Amsden, 3,625 ft.; Madison, 3,815 ft.; Big Horn, 4,290 ft.; Cambrian, 4,397 ft.

Rangely field. — Continental Oil Co. 2 Rooth, C SW SW 15-2n-103w, discovery in the Shinarump on the west side of the Rangely field, flowed 847 bbl. of 38.5° oil in 24 hours through ½-in. choke on final test before being pinched down to field allowable. The casing pressure increased during the test from 205 to 410 psi., while tubing pressure continued constant at 190 psi. Rig has been released and is being moved to 4 Rooth, a south offset.

The Rangely field has 99 producers as of August 1, and the allowable per well per day for August has been reduced from 300 to 275 bbl., and pipe-line runs for the month are estimated at 27,500 bbl. per day, some oil being taken to make up for July shortages.

East Lance Creek record well.—Continental Oil Co. 2 Bowman, SE NW SE 26-36n-64w, proved to be the largest producer and highest on structure of any well so far completed in East Lance Creek, Niobrara County, Wyoming. It flowed 260 bbl. in 24 hours through a ⅛-in. choke from the Dakota through perforations at 3,824-27 ft. No open flow test was made, but it was estimated capable of producing 1,000 bbl. per day. It proved to be 13 ft. higher than 1 Bowman, ¼ mile to the east, which made 124 bbl. per day through a ⅛-in. choke.

Three Madison lime failures.—Three widely scattered wells drilled to the Madison lime in the Cut Bank area were disappointments. Castle-Pardee 4 Tribal, NW NW NE 13-32n-6w, in the southern part of the field, 21 miles south of the nearest Madison producer, which had a show in the top of the lime at 3,025 ft., yielded no results when acidized, ran into water at 3,227 ft., and was abandoned at 3,237 ft. P. & S. Oil Co. 1 Haugen, C SW NE 11-36-6w, in which Carter Oil Co. recently acquired a half interest, located 1¼ miles west of Carter's 1 Larmon, had the Madison at 3,333 ft., and picked up sulfur water at 3,340-45 ft. It may be drilled deeper. Consolidated Gas Co. 2 State, SE NW NE 16-35n-4w, 9 miles southeast of nearest Cut Bank Madison producer, and 1¼ miles west of nearest Kevin-Sunburst well, had sulfur water at 2,495 ft. and was abandoned at 2,497 ft.

Saratoga test to Sundance.—Atlantic Refining Co. is reported to have taken over Arp & Snively 1 Seaverson, SW SE SW 30-18n-84w, Saratoga structure, Carbon County, Wyoming, which has been shut down at 3,635 ft. in the Carlile since last February, and will deepen it to the Sundance at 4,600 ft. The block contains 6,720 acres and has never had a test below the Morrison. It had some shows of green oil in upper horizons.

New operations.—Twenty new operations were reported, of which 18 were development wells and 2 were wildcats. These were distributed: 1 in Colorado; 6 in Wyoming; 12 in Montana, and 1 in the Vernal district in Utah. The Utah wildcat is Carter Oil Co. 1 Edna Davis, C NW NW 33-4s-20e, Vernal structure, Uintah County, 12 miles west of the town of Vernal and 50 miles northwest of the Rangely field. Contract has been let to Kerr-McGee Oil Industries, Inc. The Upper Jurassic is expected around 6,000 ft., and it probably will go

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to the Weber, the Rangely producing horizon. The unit, which was approved July 15, contains 57,504 acres. About 20 miles to the southeast, and between this location and the Rangely field is the old Ashley Valley gas field which produced gas for a number of years from the Dakota-Morrison sands.

Completions.—Sixteen wells were completed, of which 10 were oil wells with initial production of 2,231 bbl., 1 was a gas well, 5 were dry holes. Three completions were in the Rangely field, for 1,558 bbl., including Continental's discovery in the Shinarump. Wyoming had two completions for 308 bbl., one in Lance Creek and one in East Lance Creek. Montana had 11 completions, of which 5 were oil wells, 1 was a gas well and 5 were dry holes.

COLORADO SUCCESSFUL WILDCAT

Rangely, Rio Blanco County: New pay discovery. Continental Oil Co. 2 Rooth, C SW SW 15-2n-103w, TD 6,110 ft., flowed 847 bbl. in 24 hours through ½-in. choke, from the Shinarump, topped at 6,060 ft.

MONTANA WILDCAT FAILURES

West Kevin, Toole County: Consolidated Gas Co. 2 State, SE NW NE 16-35n-4w, dry, TD 2,497 ft., Madison 2,467 ft., sulfur water.

Cut Bank, Glacier County: P. & S. Oil Co. 1 Haugen, C SW NE 11-36-6w, dry, TD 3,345 ft., top of Madison 3,333 ft., sulfur water, plugged.

Castle-Pardee 4 Tribal-8642, NW NW NE 13-32n-6w, dry, TD 3,237 ft., sulfur water in Madison.

CALIFORNIA

S. Belridge Zone 64 Prospects Still Uncertain

LOS ANGELES.—Deeper exploratory wells in existing fields continue as the most closely watched operations in California. Many of the deeper tests are so-called "no dope" holes.

Inability to confirm earlier reports of oil showings in Zone 64 in Belridge Oil Co. 62-W-33, Kern County, deep test in the South Belridge pool, seems entirely justified this week. Operators continued drilling at 12,850 ft. in the well which is in Section 33-28s-21e. Faith in the deeper potentialities of the area, however, was displayed by Richfield Oil Corp. which made location for 1 Berry, 990 ft. south and 330 ft. east of the W¼ corner, Section 30-28s-21e, approximately 1 mile northwest of General Petroleum Corp. 1 Berry which was dry at 11,377 ft.

The deep exploratory well in the El Segundo-Playa Del Ray area, southwest of Los Angeles, designated as Six Companies 1 fee, with Shell Oil Co., Inc., in charge of operations, indicated pumping production of approximately 100 bbl. daily. The well was drilled to 7,033 ft., and plugged back to 6,940 ft. Testing operations continue.

Seven-inch pipe was run last week in C. G. Willis 1 Simons, Section 15-2s-12w, in the East Los Angeles field, for the purpose of testing showings of oil encountered in coring and drilling to current total depth of 9,800 ft. Richfield Oil Corp., already the most active operator in the quest for deep Miocene anticlinal production in the East Los Angeles field with three drilling wells, started clearing location for another test. The location now being prepared is for 1 Flood Control, Section 14-2s-12w, about a mile from the Willis test.

Limitations of existing facilities to handle the free natural gas produced from the 6,500-ft. Zone 237 wells at Wilmington, 20 miles south of Los Angeles, are resulting in a more moderate development program in that area. Runs per well were reduced August 1 to 500 bbl. daily compared with output of 1,500 to 2,000 bbl. per day for the

first completions in that pay in the fall of 1945. The per well production has been stepped down at increments of 100 bbl. per well per day at varied intervals but the reductions have occurred more frequently in the past month and operators, consequently, are under less compulsion to carry wells into the deeper pay.

New locations reported this week totaled 37, a reduction of 11 from the previous week. New work is widely scattered and is divided roughly half for the San Joaquin Valley district and the other 50 per cent split more or less evenly between the Los Angeles Basin and Coastal districts.

CALIFORNIA SUCCESSFUL WILDCAT

Ventura County, Del Valle: Bankline Oil Co. 104 Black, 13-4n-18w, pump 125 bbl. daily, 23.4° A.P.I. gr. crude, cutting 2 per cent; 7 in. at 2,920 ft., TD 3,550 ft.

CALIFORNIA WILDCAT FAILURES

Los Angeles County, La Habra: Standard of California 1 Stern Comm., 7-3s-10w, dry, 11,725 ft.

Kern County, McDonald Anticline: Atlas Production Co. 1 U. S. Anticline, ran electric log, dry, gray sand, TD 3,304 ft.

Comanche Point Area: G. B. Finch Oil Co., Ltd., 6 Tejon, removed from drilling report, long idle, TD 3,556 ft.

Lamont Area: Tide Water Associated Oil Co. 22-16 Frick, 16-31s-29e, top Trans. 7,285; top Santa Margarita, 7,436; lower Fruitvale shale; 8,220; basal Fruitvale sand, 9,213; TD 9,261 ft.

Belridge Area: Wilshire Oil Co., Inc., 4 Lehman, 18-28s-20e; Ogua sand, 975; lower Santos, 1,245; Phacoides, 1,463; Kreyenhagen, 1,500; form. test, 1,542-1,607, rec. 200 ft. gassy mud, oil scum; dry, TD 1,878 ft.

San Louis Obispo County, Cholame area: Henry E. Dawson 1 Dawson, 18-25s-16e, dry, TD 850 ft.

Tulare County, Trico area: Pacific Central Oil Co. 4 and 8 Finch, 31-23s-23e, and 13 Finch, 6-24s-25e, dropped from drilling report, long idle; TD 2,622, 3,444 and 2,600 ft., respectively.

Pixley area: Union Oil Co. 22-6 Reed, 6-22s-26e, top Santa Margarita, 2,114; Slate, 3,897; no Formosa sand, dry, TD 3,931 ft.

OKLAHOMA

New Wilcox Production Is Low-Gravity Oil

DANCIGER OIL & REFINING CO.'s Wilcox discovery, the 1 Pantlik in NW NE SW 15-12n-5e, south of the South Wilzetta pool, last week looked promising but disappointed operators, both in the low-gravity oil and the lack of enough gas to flow.

After a drill-stem test recovered some 3,660 ft. of oil, casing was run and when plug was drilled, it swabbed into pits but would not flow. Later, it was reported to have flowed an average of 8 bbl. of 25.5-gravity oil before dying.

It was suggested that this location is on the low side of a fault and that the sand would yield higher gravity oil on the high side. Two offset locations have been staked. Danciger will drill 1 Roller in SE NW NW 15-12n-5e, and Sohio Petroleum Co. staked its 1 Roller in NW SE SW 15-12n-5e, which is a 40-acre south offset to the 1 Pantlik.

Another well which had hoped for Wilcox production, in the north section of Wilzetta, was Sam King 4 Earlabaugh, NE SW NE 34-13n-5e. Casing was set on bottom at 4,502 ft. and perforations in the dolomite at 4,463-75 ft. recovered salt water. Perforations in the Hunton at 4,285-4,330 ft. and 4,260-75 ft., then acidized, resulted in a flow of 75 bbl. of oil an hour through tubing, with no water.

OKLAHOMA WILDCAT FAILURES

Cotton County: Bridwell Oil Co. 1 Seward, E/2 NW NE 8-5s-10w, dry, TD 2,153 ft., sand 757-60 ft. with slight show of oil.

Grant County: Francis Callery et al 1 Hajek, SW SW NE 19-28n-4w, dry, TD 5,318 ft., Layton 3,950 ft., Oswego 4,305 ft., Mississippi lime 4,740 ft., Woodford 5,786 ft., Wilcox 5,292 ft.

Hughes County: Charles Mee 2 Spears, SW NE SW 19-6n-8e, dry, TD 1,035 ft., no tops reported.

McIntosh County: Public Service Co. 1 Link, C SE NW 10-10n-13e, dry, TD 4,116 ft., Upper Savannah 687-1,020 ft., Lower Savannah 1,215 ft., Cameron sandy shale 1,640-85 ft., Booch 1,788 ft., Upper Gilcrease 2,280 ft., Lower Gilcrease 2,594 ft., Wapanucka 2,865 ft., Chomwell 3,105 ft. with slight show of oil and gas, Mayes 3,727 ft., Hunton 3,767 ft. with slight show of oil, Sylvan 3,836 ft., Viola 3,902 ft., dolomite 3,936 ft., Wilcox 3,950 ft.

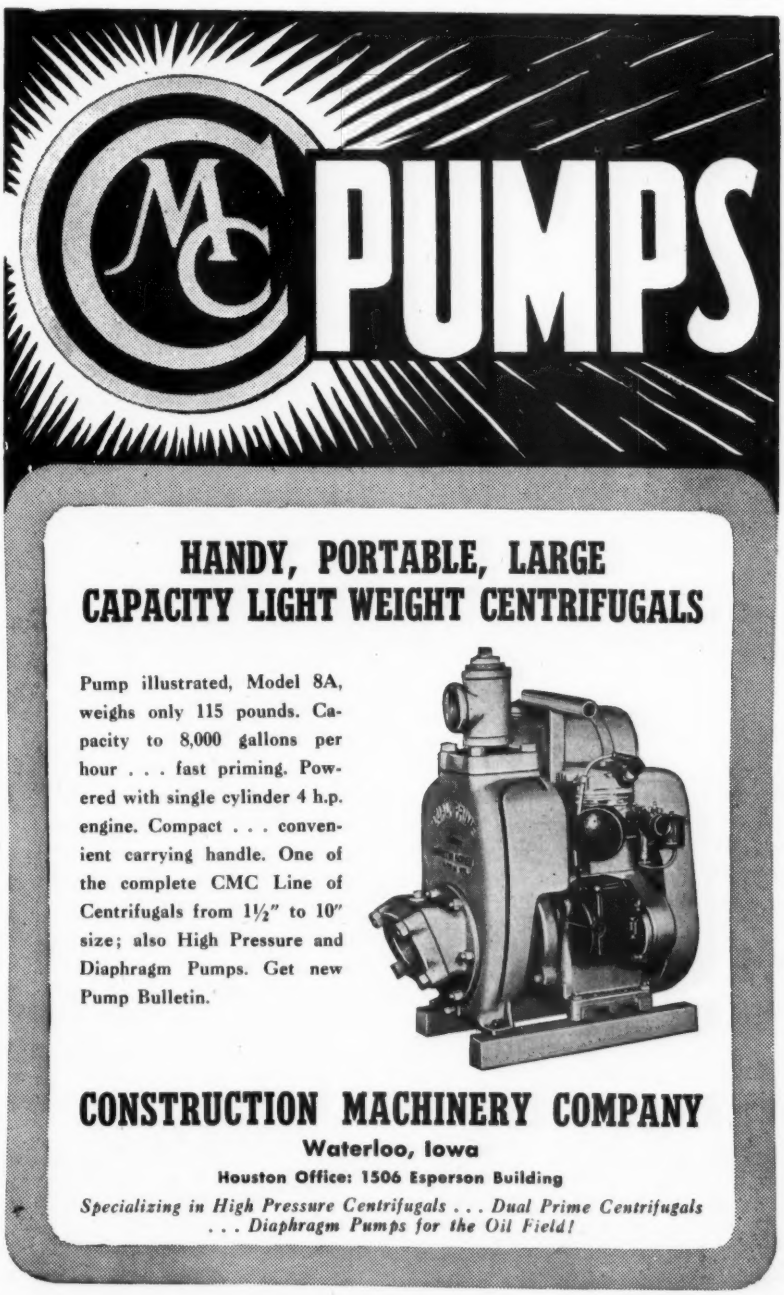
Murray County: Helmerich & Payne 1 Veal, SE SE SE 29-1n-2e, dry, TD 3,005 ft., sand 2,193 ft. with show of oil at 2,222-30 ft.

Pawnee County: J. K. Dorrance 1 Gilbert, SW SE SE 32-22n-3e, dry, TD 4,310 ft., Osage-Layton 2,867 ft., Big Lime 3,300 ft., Oswego 3,455 ft., Prue 3,650 ft., Verdigris 3,690 ft., Woodford 4,192 ft., Viola 4,230 ft., dolomite 4,258 ft., Wilcox 4,265 ft.

Pottawatomie County: Deep Rock Oil Corp. et al 1-A W. D. Hallum, NE NE SE 6-8n-5e, TD 4,347 ft., Hogshooter 1,995 ft., sand 3,350-65 ft., dolomitic lime 3,475-85 ft., Earlsboro 3,525-35 ft., Mayes 3,765 ft., Woodford 3,860 ft., Sylvan 4,063 ft., dolomite 4,260 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Cotton County: Featherstone et al 1 Ada Tunnell, NW NW NW 7-4s-10w, pumped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Okfuskee County: Loftis Drilling Co. 1 Kenneda Unit No. 1, NE NE SE, 14-12n-9e, produced 6,750,000 cu. ft. of gas from Hunton at 3,686-91 ft., Inola 2,450 ft., Bartlesville sand 2,520-2,665 ft., brown lime 2,700 ft., Booch 2,750 ft., Gilcrease sand 3,040-46 ft. and 3,049-56 ft., Woodford 3,654 ft., TD 3,705 ft.

Pawnee County: Devonian Oil Co. 1 Thornton, SE SE NW 34-20n-6e, pumped 8 bbl. oil per day from Prue at 2,724-54 ft., Hogshooter 2,058 ft., Layton 2,065 ft., Cleveland 2,402 ft., Oswego 2,615-53 ft., Verdigris 2,754 ft., Red Fork 2,920 ft., Inola 2,990 ft., Bartlesville sand 3,000 ft., TD 3,075 ft.

Pottawatomie County: J. F. Smith and Continental 1 Klinglesmith, SW SW SE 23-8n-2e, pumped 249 bbl. oil per day, 39.4° gravity, from second Wilcox at 5,637-39 ft., Cleveland 4,016 ft., Oswego 4,300 ft., second Calvin 4,425 ft., Inola 4,748 ft., Bartlesville 4,854 ft., Woodford 4,912 ft., Sylvan 5,292 ft., Viola 5,371 ft., dolomite 5,475 ft. with slight show of oil, sandy dolomite 5,625 ft. with a show of oil.

KANSAS

Pratt County Wildcat Has Small Show of Oil

LION OIL REFINING CO.'S wildcat, 1 Chance, NW NW NW 4-27-13w, had a small show of oil in the top of Arbuckle at 4,426 ft. Total depth is 4,450 ft. and a drill-stem test at 4,437-50 ft., open 15 minutes, recovered 30 ft. of mud. Operators were to run an electric log. The test is on a farmout from Hollow Drilling Co., supported by British American Oil Co. Rine Drilling Co. is drilling the test.

Also in Pratt County, some 8 miles southeast of production in the Chitwood pool, Stanolind Oil & Gas Co.'s 1 Hiskett, SE SE NW 23-29-11w, was reported running low on formations. Last report had the well drilling below 4,612 ft. Tops were, Viola 4,577 ft., Mississippi lime 4,319 ft., and Lansing at 3,783 ft.

An attempt to extend the Schmeidler pool of Ellis County ended in failure as H. H. Blair 1 Staab, SE SE NW 32-12-17w, was dry at 3,680 ft. Tops were, Lansing 3,383 ft., and Arbuckle 3,672 ft. Location is only ½ mile northeast of production in the pool.

Latest reports on the discovery of the new Rutherford pool of Pawnee County, Ben Brack 1 Rutherford, SW NE NW 8-20-16w, and which is in the process of completion, was a pump test of 185 bbl. of oil in 8 hours. Production is from the Arbuckle at 3,823 ft., total depth. Magnolia Petroleum Co. is drilling two tests here. Their 1 Rutherford is in NE SW NW 8-20-16w, and the 1 Sharp is in NE NE SW 8-20-16w.

KANSAS SUCCESSFUL WILDCAT

Rooks County: Republic Natural Gas and Keyes Drilling Co. 1 Cooper, C SE SE 14-7s-20w, pumped 18 bbl. oil per day, 32° gravity, from Arbuckle at 3,498-3,510 ft., Topeka 3,017 bt., Heebner 3,212 ft., Lansing-Kansas City 3,246 ft., TD 3,539 ft.

KANSAS WILDCAT FAILURES

Barton County: D. R. Lauck 1 Zorn, NE NE NE 1-17s-12w, dry, TD 3,375 ft., Heebner 2,971 ft., brown lime 3,067 ft., Lansing-Kansas City 3,089 ft., conglomerate 3,334 ft., Arbuckle 3,350 ft.

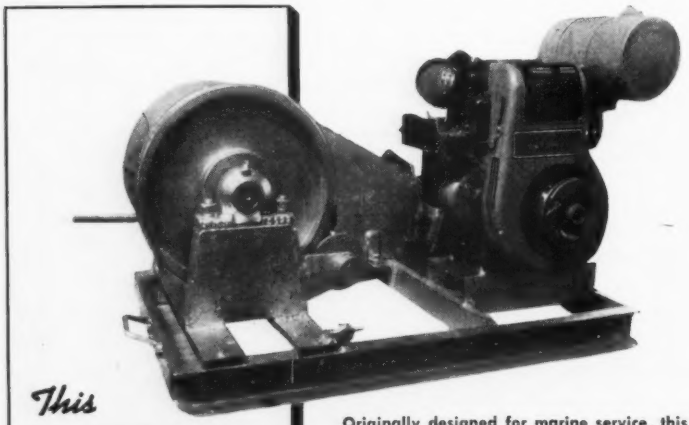
Cowley County: J. W. Trigg 1 Batdorf, SW SW NW 14-34s-7e, dry, TD 2,986 ft., Layton 2,090 ft., Kansas City 2,130 ft., Mississippi lime 2,920 ft.

Pawnee County: Continental Oil Co. 44 (1) Strat (Bruder), SE SE SE 11-22s-18w, dry, TD 4,318 ft., Lansing-Kansas City 3,624 ft., conglomerate 4,071 ft., Arbuckle 4,271 ft.

MISSOURI WILDCAT FAILURES

Atchison County: Dan Short 2 Griffin, NE NE NW 15-65n-40w, dry, TD 1,385 ft., Lansing-Kansas City 618 ft., Basal Kansas City 913 ft., sand 1,381 ft.

Cass County: T. M. Christie 1 Martensen, SE SE SE 17-45n-33w, dry, TD 715 ft., no tops reported.



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OHIO, KENTUCKY

Mifflin Gas Field Gets West Extension

COLUMBUS.—The fifth completion in the Mifflin pool, Ohio Fuel 2 Muskingum Watershed, Section 23, Mifflin Township, Ashland County, was a ⅓-mile extender to the west. It had Clinton at 2,412-25 ft., and gaged 831,000 cu. ft. natural. The next two wells to be drilled in the pool will be on the north and east sides.

Preston Oil 1 Curray-Hammer, Section 10, Clayton Township, Perry County, found Clinton sand at 3,306-49 ft. with 325,000 cu. ft. and a good show of oil. The well is to be shot this week. The company completed a 25-bbl. producer in the Hemlock Grove pool at 4 Glennis Taylor, Section 3, Bedford Township, Meigs County.

Frank Lyons is drilling at 1,800 ft. on his wildcat in East Township, Carroll County. O. Eberly et al have shut down at 805 ft. on their test in Yellow Creek Township, Columbiana County. East Ohio have spudded their deep test on A. & M. Lloyd, Tract 7, Austintown Township, Mahoning County.

The Canton area reported nine additional locations for the week. Ashland field reported eight locations followed by Cambridge six, Lancaster three, Mount Vernon two, and Brush Creek one. Cambridge field led in completions with 8 out of 27.

OHIO WILDCAT FAILURES

Lorain County, Huntington Township: Ohio Fuel 1 George Krueck, Lot 20, dry, Clinton 2,579-80 ft., TD 2,673 ft.

WESTERN KENTUCKY

OWENSBORO.—After two drill-stem tests indicating strong prospects of opening a new oil production 1 mile northwest of the Robards pool in Henderson County, Carter Oil Co. 1-C Powell, 22-O-23, has set casing at 2,750 ft. With elevation of 398 ft., first drill-stem test was made at 2,460-72 ft., recovered gas in a few minutes and a flow of oil in 1 hour. Second test at 2,524-46 ft. recovered 900 ft. of oil and 400 ft. of salt water.

Basin Drilling Co. 1 Abbott, 10-B-22, about a mile east of Geneva, and a potential half mile extension to production, is waiting on cable tools to test a show in the Waltersburg at 1,705-13 ft. A 1-hour drill-stem test at 1,705-13 ft. recovered 400 ft. of free oil and 120 ft. of oil-cut mud.

EASTERN KENTUCKY ACTIVITIES

ASHLAND.—Knott County topped the completion list in the eastern Kentucky field of operations during the past week with Kentucky-West Virginia Gas Co. accounting for all the wells. No. 5541 on the C. C. Martin property, Knott County, 1,676 ft., made 1,917,000 cu. ft. from the Salt sand. No. 822 Ballard Weddington, Pike County, 2,022 ft., completed for 794,000 cu. ft. in Big Lime. No. 815, M. M. Collins

property, Magoffin County, 2,849 ft., made 337,000 cu. ft. from Salt sand. No. 5,659, J. S. Mollett property, Martin County, 1,047 ft., was good for 492,000 cu. ft. in the Maxon. No. 814, Willie Hall property, Floyd County, 3,025 ft., made 292,000 cu. ft. from the shale after shot. No. 5,647, Wilson Damron property, Pike County, 1,768 ft., completed for 502,000 cu. ft. in the Maxon. No. 632 M. A. Davidson, Floyd County, 1,515 ft., made 73,000 cu. ft. from the Big Lime. No. 819 James Nunnery, Pike County, 3,121 ft., was dry, and so was No. 5,633 Elijah Combs, Knott County, 2,980 ft.

INDIANA

EVANSVILLE.—Continental et al 1-D Cooper Estate, deep test in 13-3s-14w, Gibson County, topped the Trenton at 6,165 ft., and is drilling below 6,230 ft. Plans call for running an electric log at about 6,350 ft. Two new wildcat locations were announced, Lichlyter et al 1 Fuller, SW NE SE 23-8n-4w, in Greene County, and E. L. Shoudy 1 Thomas, NW NE SE 8-1n-7w, in Pike County.

ILLINOIS

Possible Extension For Bible Grove

MATTOON.—One mile southeast of the Bible Grove pool, and between that and the East Bible Grove pool, Gilliam-Aspin Drilling Co. 1 Lewis, NE NE SE 15-5n-7e, is showing either for an extension, or a new pool in the McClosky lime at 2,870-76 ft. After setting 7-in. casing on the McClosky at 2,865 ft., a drill-stem test was made of a saturated section at 2,870-76 ft. and recovered gas and 1,000 ft. of clean oil in 25 minutes.

About 4 miles south of Herald in White County, Oil Management, Inc. 1 Williams, NW NE SW 14-7s-9e, between the Herald and South Concord pools has set pipe on the Aux Vases sand. A drill-stem test at 2,864-82 ft., for 1 hour, got gas in 5 minutes, and started flowing clean oil in 50 minutes.

A total of 50 drilling permits were issued last week, Wayne County leading with 9; followed by Coles, Richland, and White counties, 7 each; Hamilton, 4; Jefferson, Lawrence, and Wabash, 2 each; and 1 each in Clark, Clay, Cinton, Cumberland, Effingham, Gallatin, Jasper, Marion, Saline, and Shelby counties.

ILLINOIS WILDCAT FAILURES

Bond County: J. H. Roberts & Hayle 1 Baker, NW NW NW 17-6n-2w, dry, TD 1,117 ft., Cypress 936 ft., limestone 1,014 ft.

Clinton County: H. M. Miller 1 Yankers, SW SE NW 12-2n-2w, dry, TD 1,340 ft., Barlow lime 1,035 ft., Cypress 1,060 ft., Benoist sand 1,206 ft.

Coles County: E. A. Oberring et al 1 Biemer, SE NE NW 26-14n-7e, dry, TD 1,857 ft., Cypress 1,598 ft., Renault 1,726 ft., Ste. Genevieve 1,775 ft.

Yellow Hammer Oil Co. 1 Flynn, SE NE SE 10-13n-10e, dry, TD 1,160 ft., no tops available.

Perry County: A. J. Slater, Jr., 1 J. O. Caen, SE NE SE 4-6s-1w, dry, TD 1,739 ft., Barlow lime 1,500 ft., Benoist 1,721 ft.

Shelby County: W. R. Britton 1 Kensil, NW NW SW 22-11n-4e, dry, TD 2,002 ft., Benoist 1,804 ft., Renault 1,831 ft., Aux Vases 1,836 ft., Ste. Genevieve 1,894 ft., Fredonia 1,986 ft.

Washington County: H. J. Schlafly et al 1 Struckmeyer, SW SW SW 3-2s-1w, dry, TD 1,708 ft., Barlow lime 1,508 ft., Cypress 1,612 ft., Benoist 1,692 ft.

George Wrather et al 1 Beatch, NE NE SE 5-3s-3w, dry, TD 1,370 ft., Barlow lime 1,100 ft., Cypress 1,173 ft., Benoist 1,303 ft.

CANADIAN FIELDS

Lloydminster Gets Two Good Wells

CHATHAM.—In the Alberta section of the Lloydminster field, Ponalta Oils 3, LSD 8, 12-49-1w4, finished at 1,898 ft., good for 100 bbl. on the pump. Ponalta 4 has location in LSD 7, same section. On the Saskatchewan side, Van Lloyd 2, LSD 10, 2-49-28w3, finished at 1,880 ft. with oil sand at 1,876 ft., flowing in excess of 100 bbl.

Elk Point.—In Northern Alberta, Elk Point 1, LSD 7, 26-56-5w4, bottoming at 3,929 ft. with casing set, has drilled through 750 ft. of salt. Above the lime in which the salt was encountered the test got a sand around 1,300 ft. with 2,000,000 cu. ft. gas. Elk Point 1 was the first of a series of exploratory tests in North-Central Alberta jointly sponsored by Anglo Canadian Oil Co., Home Oil and Calgary & Edmonton Corp.

De Winton.—On the De Winton structure east of Turner Valley, Royalite-De Winton 1, LSD 14, 16-21-1w5, bottomed at 8,397 ft., has been abandoned after exhaustive tests of the Madison limestone, and of overlying formations in which oil and gas shows were encountered. A second test will probably be drilled.

Antelope Hills.—In the Antelope Hills area, eastern Alberta, Alliance 1, LSD 15, 19-20-1w4, bottoming at 3,943 ft., swabbed down 1,100 ft., and had strong showings of gas and oil. Testing is being continued. Trans Alberta-Alliance 2 has location in LSD 2, 18-20-1w4, approximately 2 miles south.

Ram River.—On the Ram River-Clearwa-

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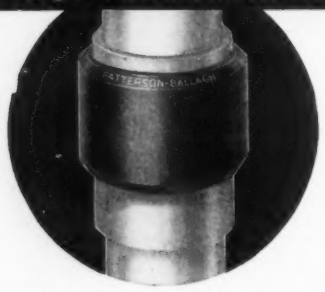

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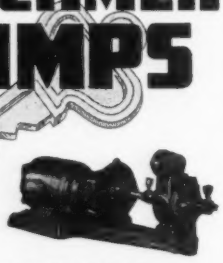

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ter structure, in the Central Alberta foothills, Ram River Oils 4, LSD 9, 36-34-10w5 is coring in soft formation below 1,390 ft. with shows of oil. Location is south and east of Ram River 3, LSD 12, 1-37-11w5, bottoming at 5,745 ft., which is redrilling to straighten below 2,896 ft.

Peace River.—After a long period of inactivity, drilling is being resumed in the Peace River district by Sam Hector and Associates of Calgary, who have tentative location for No. 1 test in 31-83-21w4, 3½ miles north and a little east of Peace River town. Rotary tools will be used, and it is planned to drill at least three wells.

APPALACHIAN FIELD

Ten Million Gasser From Oriskany in Ravenswood

PITTSBURGH.—In Ravenswood district, Jackson County, West Virginia, McIntosh & Grimm completed the test on Mary Vosburg farm with a final gage of 10,000,000 cu. ft. gas, natural, from the Oriskany sand. From a surface elevation of 942 ft. the Corniferous lime was topped at 4,998 ft., Oriskany 5,100 ft., gas 5,107-09 ft., rock pressure 1,190 lb. in 21 hours, total depth 5,114 ft. In Ripley district, Columbian Carbon Co. is drilling through the Oriskany sand in the test 901 E. Harlan Staats with a showing of 1,295,000 cu. ft. of gas at 5,056-68 ft. The surface elevation is 852 ft., Corniferous lime 4,948 ft., Oriskany 5,050 ft.

In the extension to the Elk-Poca Oriskany gas field and in Big Sandy district, Kanawha County, Falling Rock Producing Co. completed its second Oriskany test No. 77 on its fee land with a final gage of 7,433,000 cu. ft. gas. From surface elevation of 757 ft. the Corniferous lime was at 4,997 ft., Oriskany 5,116-38 ft., gas 5,126-33 ft., shot at 5,122-34 ft., rock pressure 1,400 lb. in 25 minutes, total depth 5,138 ft.

New locations totaled 11, divided amoung Barbour, Gilmer, Kanawha, Lewis, Lincoln, Nicholas, Pleasants, Ritchie, and Wyoming counties.

On Chestnut Ridge in George Township, Fayette County, Pennsylvania, Peoples Natural Gas Co. has made a location for a second test on James Walters tract, 1,730 ft. north of the Barton No. 1, to be drilled to the lower Devonian or 7,000 ft. The surface elevation is 2,454.25 ft. South of this, New Penn Development Co. et al topped the Tully lime at 6,490 ft. in the test on J. R. Smith farm from a surface elevation of 2,500 ft. The Brown shale was reached at 6,200 ft. This test was running considerably lower to the red rock but has since reversed making up more than half of the dip which with the thinning of the Tully section enhances its possibilities.

New work in southwest Pennsylvania totaled seven, scattered among Bethel, Kittanning, Mahoning and Red Bank townships, Armstrong County; Porter Township, Clarion County; Franklin Township, Greene County; Clover Township, Jefferson County.

MISSISSIPPI

Four Wells to Test Flanks Of Sharkey Platform

JACKSON.—While drilling in Mississippi has lagged for some time, locations for new wells, with permits issued on most of them, totaled 12 for the week, including C. H. Murphy and Sun Oil Co.'s Sharkey County wildcat, 1 H. T. Greer in NW NW 22-13n-6w, some 3 miles southeast of Anquilla. Balance of the new wells were: Lincoln County, five locations; Wayne County, two; and one each in Marion, Lamar, Jefferson and Jasper counties.

Location of the Murphy-Sun test, on the east flank of the Sharkey platform, is approximately 3½ miles northeast of the recently abandoned Maner Graham 1 Carpenter & Graft, in Section 25-13n-7w. This test had indications of being west of the truncation point of the lower Tuscaloosa beds, and went directly into the Glen Rose below the Cretaceous gas rock.

Three other tests are reported to be drilling on flanks of the Sharkey platform. These are: Plymouth Oil Co. 1 Anderson-Tully, in 13-9n-9w, Issaquena County; McAlester Fuel Co. 1 Anderson-Tully, 35-18n-1e, in Warren County, (both on the south flank); and Stanolind Oil & Gas Co.'s 1 Boyd, 31-10n-6w, a strat test on the southeast flank, in Sharkey County.

In Adams County, Ohio Oil Co. set surface pipe on its 12,000-ft. wildcat, the 1 Armstrong, 12-5n-3w, southeast of Natchez.

In Yazoo County, Sohio Petroleum Co. spudded in at its 1 Christopher in NE NE SW 5-11n-2w, a 5,000-ft. test about 1 mile southwest of Yazoo City.

LA.-ARK.

Spirit Lake Pool Discovery Is Completed

SHREVEPORT.—Halfway between the Fouke pool in Miller County, Arkansas, and the Midway pool of Lafayette County, but lying in Lafayette County, Austin E. Stewart's 1 Moore Estate, in NW SE 14-16s-25w, opened the Spirit Lake pool, a new fault line oil field when it flowed 10 bbl. of 40-gravity oil an hour through $\frac{7}{8}$-in. choke from perforations at 4,108-18 ft. in the Kilpatrick zone of the Glen Rose lime.

Speculations were being made as to whether or not this would establish a trend between the two pools, since production in Fouke ranges from the second Sturgis at 3,538 ft. to the Smackover at 9,550 ft.

Electric log and cores were said to show possible production in the Paluxy zone and since limestone wells must follow 40-acre spacing, operators might ask for 20-acre spacing for Paluxy wells, if that horizon should be developed.

While the well completed for 250 bbl. of oil a day through 3/32-in. choke, the Arkansas Oil and Gas Commission has set a temporary allowable of 200 bbl. a day.

Electric log tops were: Base Annona 2,645 ft., Lower Cretaceous 2,885 ft., cut fault at 2,980 ft. with top of Paluxy at 2,980 ft.; Massive anhydrite 3,930-4,100 ft.; Kilpatrick lime with porosity at 4,100-25 ft., 4,145-51 ft., total depth 4,513 ft .

Sands in the Paluxy showing oil were at 3,005-35 ft., 3,050-70 ft., 3,340-50 ft., and 3,588-3,640 ft. The Kilpatrick lime started showing for oil at 4,098-4,135 ft., and again at 4,142-52 ft.

Final perforations were with 62 shots at 4,108-18 ft., resulting in a flow of 248 bbl. of oil in 24 hours with casing pressure of 550 lb., and tubing pressure of 440 lb. The well was drilled by Crow Drilling Co., contractors.

ARKANSAS WILDCAT FAILURES

Bradley County: American Liberty Oil Co. 1 Bradley L. Co., NE NE SW 15-13s-9w, dry, TD 5,011 ft.

Union County: Guy Mabee et al 1 U. S. M., NE SW NW 31-18s-11w, dry, TD 6,416 ft.

NORTH LOUISIANA WILDCAT FAILURE

Sabine Parish: H. J. Kirk et al 1 Long Bell, SE SW NE 4-6n-13w, dry, TD 2,558 ft.

Wide Variety in 16 Big-Inch Bids

(Continued from page 54)

operated for gas as to be reconverted to oil in case of national emergency and the company would maintain in stand-by condition the oil facilities not purchased by it. Engineering exhibits were submitted in support of the company's operating plan.

4. W. Lee Clements, Barton, Ark., and Munsey Building, Washington. Offered to form a cooperative of oil and gas producers aid distributors to lease both lines for transportation of either or both oil or gas. Lease to be for 25 years with option to buy, with rental based on a fixed charge per barrel or million cubic feet to return to the Government, if earned, 7 per cent of the value of the lines less depreciation.

5. J. W. Crotty, 3710 University Boulevard, Dallas, Tex. Offered to purchase both lines for $127,500,000, paying $5,000,000 on execution of the contract and the balance in cash within 3 years. Reserved the right to convert one or both lines to gas. If converted, company would preserve and maintain all oil pumping equipment at its own expense with the Government having an option to repurchase, and in case of national emergency government could repurchase entire property at no loss to the company.

Crotty proposed to form a corporation and named as his associates: Dr. Charles A. Pohl, consulting engineer for New York City and various utility companies; H. R. Dillingham, chief engineer of the Grand Central Terminal, New York; Roy C. Coffee, formerly chief counsel for the Lone Star Oil Co.; Hart Willis, attorney for the Southern Natural Gas Co.; Oswin C. Rowbotham, Washington attorney; and Britt E. Cranfill, oil and gas operator. Critty described himself as a business executive with experience in the oil, gas, and construction industries.

6. L. M. Glasco, oil operator of Dallas, Tex. Tentative offer to form a corporation of independent producers in West Texas to purchase or lease the 20-in. line and relay it to move crude from the Permian Basin to California. Glasco said delay in ascertaining that WAA would consider this type of offer made it impossible to submit a firm bid but he gave assurance that sufficient producers would join in the venture, naming G. H. Vaughn, Walter W. Lechner, E. B. Germany, Angus G. Wynne, J. C. Hawkins, W. T. Luse A. L. Slaughter, and W. E. Butler. He said the proposal was supported by the governor and all three members of the Railroad Commission of Texas.

Glasco said these and other producers would pledge sufficient crude to operate the line and supply 10 per cent of the initial capital required, the balance to come from a government loan. He proposed a 50-year lease contract with rental of 5 cents per barrel of crude moved, with option to purchase on a negotiated basis and the Government retaining the right to recapture in case of national emergency.

7. Glen H. McCarthy of McCarthy Oil & Gas Corp., Houston. Offer to purchase both lines for $80,000,000, either all cash or $20,000,000 cash and the balance within 6 years at 4 per cent interest. Lines to be used for gas with all oil equipment maintained in its present condition. Bidder said he is in position to obtain gas markets in the East and gas supplies in Texas, particularly oil field gas now being flared.

8. Frank M. McCraw, Anniston, Ala. Proposed to form corporation to operate both lines as common carriers of crude and petroleum products only under a combination purchase and lease arrangement calculated to give the Government $146,000,000 less depreciation of 4 per cent per year since construction of the lines. Bidder offered to deposit $8,000,000 in government bonds on execution of the contract and pay rental of 8 cents per barrel or a minimum of $5,000,000 per year on the big-inch and 9.5 cents per barrel or a minimum of $3,000,000 per year for the 20-in. Bid was signed by H. E. McMeese, general counsel.

9. John R. Moroney, president of Petroleum Royalty Co. and general counsel of Interstate Theaters, Dallas. Offered to lease both lines at rental of 15 cents of gross income for 30 years, with option to purchase at original cost less depreciation at standard rates. Proposed to form a corporation and named as his associates Judge A. U. Puckitt, Dallas; R. W. Fair, oil operator of Tyler, Tex., and Bert Aston, oil operator of Roswell, N. M. The company would have the right to use either or both lines for whatever product is indicated by economics or the national interest, but the bidder stated he had made preliminary arrangements for adequate gas to fill both lines.

10. Noyack Oil Corp., 101 Cedar Street, New York, and Tulsa. Offered to buy both lines for $80,000,000 or either line alone for $40,000,000 payment to be in mortgage bonds and Class A stock. Lines to be used as common carriers for crude and products but with reservation of right to use the 20-in. for natural gas for the first 7 years, after which it would be reconverted to oil. If the 20-in. is sold alone the Government at its own expense would alter it so that its western terminus would be Longview.

11. Russell Palmer, Washington Hotel, Washington. Offered to form a corporation to purchase both lines for $135,000,000 if used for oil or $115,000,000 if used for gas. Payment to be in income bonds which in 5 years would net the Government $8,050,000 per year. Use of lines to be determined after survey of the company and WAA, with the Government paying the cost of rehabilitating the lines or converting them to gas. If converted to gas the Government is to stand the expense of maintaining the unused oil pumping stations and other equipment.

12. E. Holley Poe, 70 Pine Street, New York, and Homer Building, Washington. Offered to lease both lines for 40 years at a total rental of $260,000,000, or alternatively to purchase them for $100,000,000. Both lines to be used for gas but the bidder to maintain oil pumping and storage facilities and the Government retaining the right to recapture in event of a national emergency.

Poe said he and his associates, E. DeGolyer of Dallas and Charles I. Francis, Herman Brown, and George R. Brown of Houston, would supply the initial capital to form a corporation, with stock sold to the public through an underwriting syndicate, thus assuring widespread ownership.

The lease offer was for 40 years at 5½ cents per 1,000 cu ft. of gas sold, to yield the Government a minimum of $6,500,000 per year. If reconverted to oil the minimum rent would continue but based on a comparable rate per barrel shipped. At end of 40 years the lines to be returned to the Government in good condition, or bidder have the option to purchase, or new lease to be negotiated. The purchase offer was $80,000,000 cash, plus 5½ cents per 1,000 cu. ft. in any year movement exceeds 120,000,000,000 cu. ft. until the Government has received a total of $100,000,000.

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Ryan offered to lease the big-inch with rental based on crude throughput, with option to purchase at $40,000,000. Offered outright purchase of the 20-in. products line for $30,000,000, but because of need for spending $25,000,000 to $30,000,000 for feeder and distribution lines asked for deferred-payment plan involving $5,000,000 cash, $5,000,000 in 3 months, $5,000,000 after new construction is in operation; $7,500,000 in debenture bonds, and $7,500,000 in income notes payable in years when net income exceeds 5 per cent of total investment.

Operating plan proposed to build products-feeder lines from independent and government-owned surplus refineries in North and East Texas, Gulf Coast, Louisiana, and Oklahoma, and distribution lines to market areas in Illinois, Indiana, Michigan, and Ohio, apparently abandoning the eastern end of the 20-in. line. Additional crude feeder lines would be connected with the big-inch, and crude would be shipped to the Atlantic Seaboard if it proved profitable, but chief use would be to ship crude to refineries east of the Mississippi and north of the Ohio rivers via new distribution lines to be constructed.

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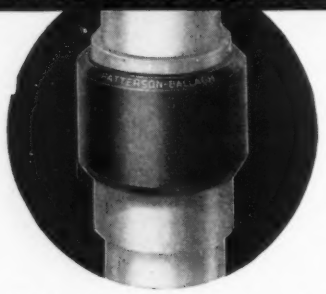

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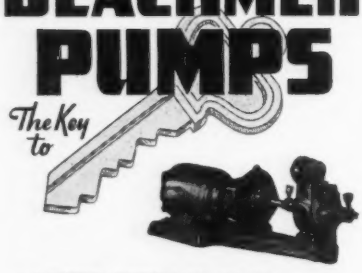

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Write for Bulletin 102 PUMPS FOR THE PETROLEUM INDUSTRY which explains why the "Bucket Design" (swinging vane principle) maintains pumping capacity by automatically compensating for wear and how the buckets, when finally worn out, are easily replaced and the pump restored to its normal capacity.

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ter structure, in the Central Alberta foothills, Ram River Oils 4, LSD 9, 36-34-10w5 is coring in soft formation below 1,390 ft. with shows of oil. Location is south and east of Ram River 3, LSD 12, 1-37-11w5, bottoming at 5,745 ft., which is redrilling to straighten below 2,896 ft.

Peace River.—After a long period of inactivity, drilling is being resumed in the Peace River district by Sam Hector and Associates of Calgary, who have tentative location for No. 1 test in 31-83-21w4, 3½ miles north and a little east of Peace River town. Rotary tools will be used, and it is planned to drill at least three wells.

APPALACHIAN FIELD

Ten Million Gasser From Oriskany in Ravenswood

PITTSBURGH.—In Ravenswood district, Jackson County, West Virginia, McIntosh & Grimm completed the test on Mary Vosburg farm with a final gage of 10,000,000 cu. ft. gas, natural, from the Oriskany sand. From a surface elevation of 942 ft. the Corniferous lime was topped at 4,998 ft., Oriskany 5,100 ft., gas 5,107-09 ft., rock pressure 1,190 lb. in 21 hours, total depth 5,114 ft. In Ripley district, Columbian Carbon Co. is drilling through the Oriskany sand in the test 901 E. Harlan Staats with a showing of 1,295,000 cu. ft. of gas at 5,056-68 ft. The surface elevation is 852 ft., Corniferous lime 4,948 ft., Oriskany 5,050 ft.

In the extension to the Elk-Poca Oriskany gas field and in Big Sandy district, Kanawha County, Falling Rock Producing Co. completed its second Oriskany test No. 77 on its fee land with a final gage of 7,433,000 cu. ft. gas. From surface elevation of 757 ft. the Corniferous lime was at 4,997 ft., Oriskany 5,116-38 ft., gas 5,126-33 ft., shot at 5,122-34 ft., rock pressure 1,400 lb. in 25 minutes, total depth 5,138 ft.

New locations totaled 11, divided amoung Barbour, Gilmer, Kanawha, Lewis, Lincoln, Nicholas, Pleasants, Ritchie, and Wyoming counties.

On Chestnut Ridge in George Township, Fayette County, Pennsylvania, Peoples Natural Gas Co. has made a location for a second test on James Walters tract, 1,730 ft. north of the Barton No. 1, to be drilled to the lower Devonian or 7,000 ft. The surface elevation is 2,454.25 ft. South of this, New Penn Development Co. et al topped the Tully lime at 6,490 ft. in the test on J. R. Smith farm from a surface elevation of 2,500 ft. The Brown shale was reached at 6,200 ft. This test was running considerably lower to the red rock but has since reversed making up more than half of the dip which with the thinning of the Tully section enhances its possibilities.

New work in southwest Pennsylvania totaled seven, scattered among Bethel, Kittanning, Mahoning and Red Bank townships, Armstrong County; Porter Township, Clarion County; Franklin Township, Greene County; Clover Township, Jefferson County.

MISSISSIPPI

Four Wells to Test Flanks Of Sharkey Platform

JACKSON.—While drilling in Mississippi has lagged for some time, locations for new wells, with permits issued on most of them, totaled 12 for the week, including C. H. Murphy and Sun Oil Co.'s Sharkey County wildcat, 1 H. T. Greer in NW NW 22-13n-6w, some 3 miles southeast of Anquilla. Balance of the new wells were: Lincoln County, five locations; Wayne County, two; and one each in Marion, Lamar, Jefferson and Jasper counties.

Location of the Murphy-Sun test, on the east flank of the Sharkey platform, is approximately 3½ miles northeast of the recently abandoned Maner Graham 1 Carpenter & Graft, in Section 25-13n-7w. This test had indications of being west of the truncation point of the lower Tuscaloosa beds, and went directly into the Glen Rose below the Cretaceous gas rock.

Three other tests are reported to be drilling on flanks of the Sharkey platform. These are: Plymouth Oil Co. 1 Anderson-Tully, in 13-9n-9w, Issaquena County; McAlester Fuel Co. 1 Anderson-Tully, 35-18n-1e, in Warren County, (both on the south flank); and Stanolind Oil & Gas Co.'s 1 Boyd, 31-10n-6w, a strat test on the southeast flank, in Sharkey County.

In Adams County, Ohio Oil Co. set surface pipe on its 12,000-ft. wildcat, the 1 Armstrong, 12-5n-3w, southeast of Natchez.

In Yazoo County, Sohio Petroleum Co. spudded in at its 1 Christopher in NE NE SW 5-11n-2w, a 5,000-ft. test about 1 mile southwest of Yazoo City.

LA.-ARK.

Spirit Lake Pool Discovery Is Completed

SHREVEPORT.—Halfway between the Fouke pool in Miller County, Arkansas, and the Midway pool of Lafayette County, but lying in Lafayette County, Austin E. Stewart's 1 Moore Estate, in NW SE 14-16s-25w, opened the Spirit Lake pool, a new fault line oil field when it flowed 10 bbl. of 40-gravity oil an hour through $\frac{7}{16}$-in. choke from perforations at 4,108-18 ft. in the Kilpatrick zone of the Glen Rose lime.

Speculations were being made as to whether or not this would establish a trend between the two pools, since production in Fouke ranges from the second Sturgis at 3,538 ft. to the Smackover at 9,550 ft.

Electric log and cores were said to show possible production in the Paluxy zone and since limestone wells must follow 40-acre spacing, operators might ask for 20-acre spacing for Paluxy wells, if that horizon should be developed.

While the well completed for 250 bbl. of oil a day through 3/32-in. choke, the Arkansas Oil and Gas Commission has set a temporary allowable of 200 bbl. a day.

Electric log tops were: Base Annona 2,645 ft., Lower Cretaceous 2,885 ft., cut fault at 2,980 ft. with top of Paluxy at 2,980 ft.; Massive anhydrite 3,930-4,100 ft.; Kilpatrick lime with porosity at 4,100-25 ft., 4,145-51 ft., total depth 4,513 ft .

Sands in the Paluxy showing oil were at 3,005-35 ft., 3,050-70 ft., 3,340-50 ft., and 3,588-3,640 ft. The Kilpatrick lime started showing for oil at 4,098-4,135 ft., and again at 4,142-52 ft.

Final perforations were with 62 shots at 4,108-18 ft., resulting in a flow of 248 bbl. of oil in 24 hours with casing pressure of 550 lb., and tubing pressure of 440 lb. The well was drilled by Crow Drilling Co., contractors.

ARKANSAS WILDCAT FAILURES

Bradley County: American Liberty Oil Co. 1 Bradley L. Co., NE NE SW 15-13s-9w, dry, TD 5,011 ft.

Union County: Guy Mabee et al 1 U. S. M., NE SW NW 31-18s-11w, dry, TD 6,416 ft.

NORTH LOUISIANA WILDCAT FAILURE

Sabine Parish: H. J. Kirk et al 1 Long Bell, SE SW NE 4-6n-13w, dry, TD 2,558 ft.

Wide Variety in 16 Big-Inch Bids

(Continued from page 54)

operated for gas as to be reconverted to oil in case of national emergency and the company would maintain in stand-by condition the oil facilities not purchased by it. Engineering exhibits were submitted in support of the company's operating plan.

4. W. Lee Clements, Barton, Ark., and Munsey Building, Washington. Offered to form a cooperative of oil and gas producers aid distributors to lease both lines for transportation of either or both oil or gas. Lease to be for 25 years with option to buy, with rental based on a fixed charge per barrel or million cubic feet to return to the Government, if earned, 7 per cent of the value of the lines less depreciation.

5. J. W. Crotty, 3710 University Boulevard, Dallas, Tex. Offered to purchase both lines for $127,500,000, paying $5,000,000 on execution of the contract and the balance in cash within 3 years. Reserved the right to convert one or both lines to gas. If converted, company would preserve and maintain all oil pumping equipment at its own expense with the Government having an option to repurchase, and in case of national emergency government could repurchase entire property at no loss to the company.

Crotty proposed to form a corporation and named as his associates: Dr. Charles A. Pohl, consulting engineer for New York City and various utility companies; H. R. Dillingham, chief engineer of the Grand Central Terminal, New York; Roy C. Coffee, formerly chief counsel for the Lone Star Oil Co.; Hart Willis, attorney for the Southern Natural Gas Co.; Oswin C. Rowbotham, Washington attorney; and Britt E. Cranfill, oil and gas operator. Critty described himself as a business executive with experience in the oil, gas, and construction industries.

6. L. M. Glasco, oil operator of Dallas, Tex. Tentative offer to form a corporation of independent producers in West Texas to purchase or lease the 20-in. line and relay it to move crude from the Permian Basin to California. Glasco said delay in ascertaining that WAA would consider this type of offer made it impossible to submit a firm bid but he gave assurance that sufficient producers would join in the venture, naming G. H. Vaughn, Walter W. Lechner, E. B. Germany, Angus G. Wynne, J. C. Hawkins, W. T. Luse A. L. Slaughter, and W. E. Butler. He said the proposal was supported by the governor and all three members of the Railroad Commission of Texas.

Glasco said these and other producers would pledge sufficient crude to operate the line and supply 10 per cent of the initial capital required, the balance to come from a government loan. He proposed a 50-year lease contract with rental of 5 cents per barrel of crude moved, with option to purchase on a negotiated basis and the Government retaining the right to recapture in case of national emergency.

7. Glen H. McCarthy of McCarthy Oil & Gas Corp., Houston. Offer to purchase both lines for $80,000,000, either all cash or $20,000,000 cash and the balance within 6 years at 4 per cent interest. Lines to be used for gas with all oil equipment maintained in its present condition. Bidder said he is in position to obtain gas markets in the East and gas supplies in Texas, particularly oil field gas now being flared.

8. Frank M. McCraw, Anniston, Ala. Proposed to form corporation to operate both lines as common carriers of crude and petroleum products only under a combination purchase and lease arrangement calculated to give the Government $146,000,000 less depreciation of 4 per cent per year since construction of the lines. Bidder offered to deposit $8,000,000 in government bonds on execution of the contract and pay rental of 8 cents per barrel or a minimum of $5,000,000 per year on the big-inch and 9.5 cents per barrel or a minimum of $3,000,000 per year for the 20-in. Bid was signed by H. E. McMeese, general counsel.

9. John R. Moroney, president of Petroleum Royalty Co. and general counsel of Interstate Theaters, Dallas. Offered to lease both lines at rental of 15 cents of gross income for 30 years, with option to purchase at original cost less depreciation at standard rates. Proposed to form a corporation and named as his associates Judge A. U. Puckitt, Dallas; R. W. Fair, oil operator of Tyler, Tex., and Bert Aston, oil operator of Roswell, N. M. The company would have the right to use either or both lines for whatever product is indicated by economics or the national interest, but the bidder stated he had made preliminary arrangements for adequate gas to fill both lines.

10. Noyack Oil Corp., 101 Cedar Street, New York, and Tulsa. Offered to buy both lines for $80,000,000 or either line alone for $40,000,000 payment to be in mortgage bonds and Class A stock. Lines to be used as common carriers for crude and products but with reservation of right to use the 20-in. for natural gas for the first 7 years, after which it would be reconverted to oil. If the 20-in. is sold alone the Government at its own expense would alter it so that its western terminus would be Longview.

11. Russell Palmer, Washington Hotel, Washington. Offered to form a corporation to purchase both lines for $135,000,000 if used for oil or $115,000,000 if used for gas. Payment to be in income bonds which in 5 years would net the Government $8,050,000 per year. Use of lines to be determined after survey of the company and WAA, with the Government paying the cost of rehabilitating the lines or converting them to gas. If converted to gas the Government is to stand the expense of maintaining the unused oil pumping stations and other equipment.

12. E. Holley Poe, 70 Pine Street, New York, and Homer Building, Washington. Offered to lease both lines for 40 years at a total rental of $260,000,000, or alternatively to purchase them for $100,000,000. Both lines to be used for gas but the bidder to maintain oil pumping and storage facilities and the Government retaining the right to recapture in event of a national emergency.

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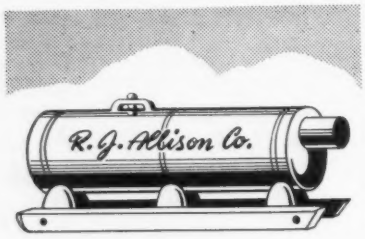

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DAY OR NIGHT

Among the

Drilling Contractors

Young Bros., Long Beach, Calif., have contract for deepening Liese and Zimmer 1 Kellogg at Torrance, Los Angeles County.

Roger Lacy, Longview, Tex., will drill C. L. Carlock's 1 Harrison, NE NW SE 25-5n-4w, on a Sun Oil Co. farmout about 2½ miles west of the North Lindsay area of McClain County, Oklahoma. Objective is the second Wilcox zone.

Camay Drilling Co., Los Angeles, has started deepening operations on Whittier Associates 3 Barham which produced 120 bbl. of 26-gravity oil on a 24-hour pumping test several weeks ago at 5,910 ft. The well is in the Los Alamos area, Santa Barbara County. Camay has four rotary rigs operating in the Wilmington pool, 20 miles south of Los Angeles, for Long Beach Oil Development Co. Another Camay rig is drilling Kreiger Oil Co.'s test in the Cat Canyon area, Santa Barbara County.

Penrod Drilling Co. has the contract for Pan-American Production Co.'s 1 USA in SE NE 14-3n-7e, Smith County, Mississippi. Operators were moving in materials last week.

Mealy-Wolfe Drilling Co. will drill Cities Service Oil Co.'s 1 Thompson, SW NW SW 13-9n-11e. Location is southeast of the Alabama pool in Hughes County, Oklahoma.

Jack Fitzpatrick, Wewoka, Okla., has contract for a 2,100-ft. test in Pontotoc County, Oklahoma. The well is C. L. Carlock's 1 Larmons, NW SW SE 31-5n-4e, west of the old Bebee field.

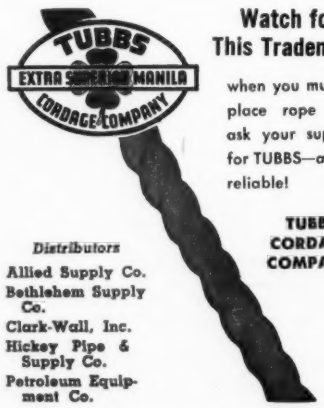
Miller & York, Bakersfield, Calif., have contracted to drill a wildcat about 6 miles northeast of Paso Robles, Calif., for Paso Robles Petroleum Associates. Operating company has a block of about 6,000 acres.

Val Tanner has drilling contract for Loual Drilling Co.'s 3,500-ft. test four miles east of Ardmore, at the 1 Champlin in NE NE NW 25-4s-2e, Carter County, Oklahoma.

Guy Mabee Drilling Co. was awarded contract for a 5,000-ft. wildcat test north of the Mabee pool in West Texas at the Mabee Oil Co. 1-20 J. E. Mabee fee, in NW NW of section 29, block 39, township 2n, G&MMB&A survey, Andrews County, Texas.

Pike Drilling Co., Los Angeles, is currently operating eight rigs, including four assigned to exploratory wells. A well projected to 10,000 ft. for exploration of deep possibilities in the Inglewood-Potrero shallow area, southwest of Los Angeles, and for account of Basin Oil Co., designated as 1 Standard Brick, is progressing at 5,000 ft. Another Pike rig is drilling at 3,400 ft. on A. W. Lyddon 1 Crew, 2½ miles north of the same operator's discovery on the Anaheim Sugar fee, in the Newport-Huntington Beach field. Lyddon's second deep test in the area is drilling at 3,400 ft. and is projected to 7,500 ft. Pike is setting casing at 9,800 ft. in C. G. Willis 1 Simons to test deep showings in the East Los Angeles pool. In Ventura County, Pike is drilling at 4,500 ft. in L. M. Lockhart 1 MacCrate on the Riva Ranch and the test is projected to 6,500 ft.

Jones, Shelburne & Farmer, Inc., Oklahoma City and Great Bend, Kans., has contracted to drill Sohio Petroleum Co.'s 4 Bemis, in the NW NW NE 33-11s-17w, Ellis County, Kansas. The same company is below 3,000 ft. on a wildcat five miles northwest of the city of Paris, Lamar County, Texas. The well is being drilled on a 20,000-acre block assembled by Fred Jones of Oklahoma City.



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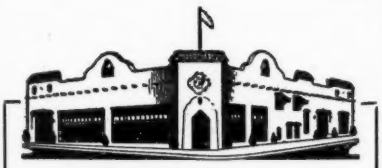


REPAIR 'LAB' FOR

Diesel Fuel Injection Pumps

Magneto Ignition is an authorized Sales-and-Service Distributor for American Bosch and Scintilla Diesel Fuel Injection Pumps and Nozzles.

Our repair and service laboratory is equipped with special factory tools and our personnel is trained with factory standards and requirements. Diesel Fuel Injection Pumps and Nozzles sent to us for repair are returned promptly and in factory condition.

Write for Additional Information

MAGNETO IGNITION CO., Inc.
701 WEST 5th ST. • TULSA, OKLA.

Russell W. Cooper will drill a wildcat on the Clyde Mead farm in SE SW NW 3-2n-13w, Allegan County, Michigan.

Sam Tennant Drilling Co. was reported drilling below 2,000 ft. on the Waldschmidt Farm in the SE SE SW of 15-28-3e, five miles east of Newkirk in Kay County, Oklahoma, for the Burress-Morrow Co. of Oklahoma City.

Buaas Drilling Corp., Los Angeles, has been granted business permit by the California Corporation Commission. Directors of the company are Verle N. Fry, Marvin M. Chesebro and E. L. Scheas.

Robert W. Atha has drilling contract for Eddie H. Bell's wildcat, 1 Bates, SW NW 12-13n-3e, three miles east of Shepherd in Coe Township, Isabella County, Michigan.

California Crude Price Advance Justified

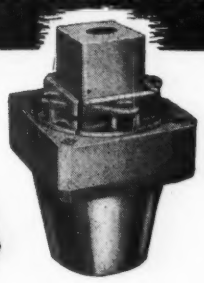
(Continued from page 56)

Most of the significant and substantial discoveries during the war consisted of new pools in existing fields. In producing a peak of 941,000 bbl. per day in May 1945, with only slightly lower quantities in most of the other war months, California operators incurred a net reduction of approximately 25 per cent in prewar reserves. Development drilling at accelerated rates accounted almost entirely for the increased production over the last prewar year of 630,000 bbl. per day recorded for 1941. The normal prewar decline of about 12 per cent in production from older fields was practically eliminated by increased development drilling. But almost without exception, the increase of more than 300,000 bbl. of production, comparing prewar withdrawals with peak wartime output, was drawn from previously discovered fields. Most of the so-called newly discovered pools (new pays) were either known to exist or their presence strongly suspected because of structural analogy drawn from nearby or similar fields.

Full credit for meeting exigencies of the war period, despite uninviting economic conditions, was extended to the producing end of the California industry in Standard of California's price announcement which said:

"Prices throughout the war were below the cost of discovery and production of crude oil, with only nominal increases allowed in that period. These were entirely inadequate to cover costs, which today are still higher. It is a tribute to the petroleum industry that producers broke all records in turning out crude under unfavorable economic conditions."

DRIVING TORQUE CUSHIONED WITH



BJ KELLY BUSHING

Bushing Body is a solid, one piece unit with a corrugated inner core. An oil resistant synthetic rubber cushion absorbs the shock of drilling torque. Bushing is equipped with four slips inside the rubber cushion, faced with liners made of anti-friction material. These liners take all the wear and are reversible for long economical life. Ask the BJ man or see your supplier.

BYRON JACKSON CO.
Houston • LOS ANGELES • New York

FACTS
ABOUT COMPLETING ANY WELL, IF YOU ARE INTERESTED IN ITS FUTURE

The inside of the casing should be scraped!

Burrs from gun-shot holes, hardened cement and mud, paraffine and mill or rust scale, all can be removed from the inside of your casing. Think of the saving of time and money when you can run swabs and packers at any future time without tearing up rubbers; think how you can run tools in and out of the hole without hanging up on any obstructions; think how securely you can pack off against clean, smooth casing. Plan ahead to scrape your casing while the rig is up, and

Phone the Baker man in your territory . . .

BAKER
ROTARY
CASING SCRAPER

PERSONALS

M.W. Kibre Active in Work of C.N.G.A. Since 1929

M W. KIBRE, new president of California Natural Gasoline Association for its 1946-47 term, has been active in the association's technical work for the last 17 years.

Kibre, who is assistant manager of the gas department for General Petroleum Corp. of California, started his industrial career with the Celite Corp. as a chemist in 1927, shortly after graduating from the University of California with a B.A. degree in chemistry.

From the Celite Corp. he went to the Santa Fe Springs laboratory of General Petroleum, where he worked as a chemist until 1937, when he was transferred to the Vernon office as a gas engineer. Since that time his promotion in the gas department has been rapid: superintendent in 1942, general superintendent in 1944, and assistant manager in 1946.

In 1929 he was appointed to the fractional analysis committee, an appointment which he held until 1937 when he became a member of the technical committee. During 1940-41 he served as technical committee chairman. Last year he served as vice president of the association and chairman of the advisory committee.

J. O. Ledermann, chief engineer for Societe Nationale des Petroles Languedoc Mediterranee, was recently in Titusville, Pa., to inspect new equipment. Accompanying him were **Charles R. Roth** and **Leon Valat.** The group left to tour Texas and Oklahoma oil centers.

D. K. Harger, superintendent of the light-oil division at the Standard Oil Co. of California Richmond refinery, has been promoted to manager of all refinery operations at the company's El Segundo plant. He has been employed by Standard of California since 1926 and 13 of his 20 years with the company were spent at the El Segundo refinery.

F. E. Hatfield has been named superintendent of production in the Fort Worth district of Gulf Oil Corp., succeeding **E. A. Wahlstrom.** Hatfield has been with the company since 1921, recently returning from Venezuela where he was assistant manager of the eastern division of Mene Grande Oil Co., a Gulf subsidiary.

J. B. Harshman, general manager of Stanolind Pipe Line Co., has had his duties enlarged to assume those formerly filled by the vice president in charge of operations, **William G. Heltzel,** who recently resigned. **T. R. Aude** has been named assistant general manager in charge of engineering and construction, and **J. R. Polston** has been promoted to chief engineer. **W. E. Taylor** has succeeded the late G. W. Burley as assistant treasurer.

Joe Ham, formerly superintendent of District 4 at Oklahoma City for Empire Pipeline Co., has been made superintendent for District 7 with headquarters at Beaumont, Tex. He succeeds **H. H. Hines,** who resigned. **M. T. Fairchild** has become superintendent at Oklahoma City, while **O. V. Adkins** is the new assistant superintendent for District 3 at Ponca City, Okla., replacing Fairchild. In District 6 at Gladewater, Tex., **J. W. Fagan** has been designated superintendent succeeding **J. P. McInerney,** who retired.

W. H. Williams, formerly superintendent at Warren Petroleum Corp.'s plant at Graham, Okla., has been promoted to superintendent of Warren's new plant at Holliday, Tex.

S. A. Lynch, former North Texas Agricultural College geology department head, has been appointed head of the geology department at Texas A. & M. College. **Joseph J. Graham,** lecturer at the University of California, and **William C. Rasmussen,** geologist with the U. S. Geological Survey, have been appointed associate professors of the department. **Stewart Bevan,** formerly with Carter Oil Co., also has been added as an acting assistant professor.

C. E. Reistle, Jr., former general superintendent of the production department of Humble Oil & Refining Co., has become manager of the production department in one of a series of executive personnel changes. **H. C. Wiess,** Humble president, said expansion of the company's activities and consequent necessity for a broader distribution of supervisory responsibility had made desirable creation of several new positions and shifting of various personnel. Duties and responsibilities of **Morgan J. Davis,** chief geologist, have been broadened to include management of the exploration department; **Ray H. Horton** has been appointed manager of the industrial relations department; and **D. F. Haynes** has been made manager of the crude-oil department. **R. C. Barbour,** former East Texas Division production superintendent, has been made general superintendent of the production department, succeeding Reistle. **C. W. DeLancey** has been named superintendent of the Gulf Coast Division, production department, succeeding **G. B. Corless** whose resignation was announced earlier. **R. E. Brides,** formerly Gulf Coast Division engineer, will take over DeLancey's old duties as assistant superintendent, Gulf Cost division. **R. J. Schilthuis,** former division petroleum engineer in the Southwest Texas Division, will assume the newly created position of assistant superintendent of the natural-gas division of the production department. **H. S. Warner** and **K. R. Dailey** have been appointed assistant managers of the industrial relations department, both newly created positions. Two new positions of assistant chief geologist have also been created and added to the staff of Chief Geologist **Morgan J. Davis. J. Ben Carsey,** formerly division geologist of the Louisiana-Mississippi Division, and **Ed J. Hamner,** formerly assistant division geologist in the Southwest Texas Division, have been named to fill the new posts. Carsey will be in charge of exploration work, and Hamner of production geology and geological problems related to development.

C. Herbert Griffin, Jr., has been appointed general field superintendent in charge of production and drilling for Wasatch Oil Refining Co. and Idaho Refining Co.

A certificate honoring the Paulsboro, N. J., refinery of Socony-Vacuum Oil Co., Inc., was recently presented by Howard W. Sheldon (left), refinery manager, to Archer Ashton, safety supervisor of the refinery. The certificate was presented for the refinery's record of 3,051,504 hours without a disabling injury. This is the greatest number of hours ever worked by a Socony-Vacuum group without a disabling injury and covers a period of nearly 8 months. The refinery employs 2,155 persons

George Leigh-Jones has succeeded **Sir Frederick Godber** as chairman of the board of Shell Union Oil Corp. Leigh-Jones has been president of Shell Oil Co., Inc., at San Francisco; he is also managing director of Shell Transport & Trading Co., London.

C. R. Bickel, division manager at Centralia, Ill., for Shell Oil Co., Inc., has been transferred to Oklahoma City with the movement of the Illinois division there. He will head the combined Oklahoma - Kansas - Illinois division and succeeds **W. H. Burke,** who has been promoted to chief exploitation engineer. **Henry Ten Brocke,** senior exploitation engineer at Centralia, has been transferred to Wichita, Kans.

Jack R. Williams has joined Cities Service Oil Co. as a chemical engineer in the gasoline and chemical division at the Tallant, Okla., laboratory. Other new members of the Cities Service organization include **James C. Morris,** geologist at Abilene, Tex.; **John W. Young,** seismograph party manager; and five junior engineers in the engineering division: **B. W. Hunton, Cornelius R. Neal, Sam R. Roberson, Connie L. Wilson,** and **Robert E. Price.**

Robert L. Carruthers, of The California Co., has been elected permanent chairman of the Operators' Committee for the Rangely, Colorado, field. The new committee succeeds the temporary organization of which **Hugh A. Stewart,** The Texas Co., was chairman.

Howard C. King, comptroller of Ohio Oil Co., has been elected to the board of directors to fill the vacancy created by the retirement of **Frank A. Billstone. Charles H. Smith** has succeeded Billstone as treasurer.

J. R. Schwabrow has been appointed supervisor of oil and gas operations, northwestern region, for the U. S. Geological Survey at Casper, Wyo. He succeeds **Ernest A. Hanson.**

Jack Evans, who has been assistant general manager of Shell Co. (Porto Rico) Ltd. since his release from the Army, will shortly begin new duties as resident representative for Asiatic Petroleum Corp. in Washington, D. C. During the war Evans was Army chief of the Latin American section of the Army-Navy Petroleum Board.

LeRoy Francis, Carter Oil Co., has been elected president of the Mississippi Oil Scouts Association, succeeding **Ray Stevens,** Shell Oil Co., Inc. **Virgil W. Michael,** Amerada Petroleum Corp., succeeded **Ray Shively,** Transwestern Oil Co., as secretary. Reelected vice president and treasurer respectively were **Claude Teel,** Skelly Oil Co., and **Carlos Greer,** Union Oil Co. of California. **E. W. Mitchell** of Phillips Petroleum Co., was named to edit the yearbook.

H. L. BEDELL

H. L. Bedell, chief chemist of the Socony-Vacuum Oil Co., Inc., White Eagle Division at Augusta, Kans., has been elected chairman of the Wichita, Kans., Section of the American Chemical Society for 1946-47. Section officers elected are: **Eldon Means** of Means Laboratories, Wichita, vice chairman, and **B. F. Hartman,** process engineer of the Socony-Vacuum White Eagle Division, secretary-treasurer. The retiring chairman, **L. C. Krieder,** head of the department of chemistry at Bethel College, Newton, Kans., was named to the society's national council. Section executive committee members include **L. E. Cranston,** operations supervisor of Socony-Vacuum White Eagle Division, and **Lloyd McKinley,** head of the department of chemistry at the University of Wichita.

Albert C. Mattei, president, Honolulu Oil Corp., **James Tamham,** vice president, The Texas Co.; **Eugene Holman,** president, Standard Oil Co., New Jersey; and **J. S. Bridewell,** president, Bridewell Oil Co., have been asked to serve on a committee on natural resources now being formed by the United States Chamber of Commerce.

Harry H. Mack, vice president in charge of production for Sunray Oil Corp., has been appointed to a special administrative post to assist **C. H. Wright, president.** He will handle general administrative duties relating to all phases of the company's operations. **James K. Ellis,** former vice president in charge of production for Transwestern Oil Co., has succeeded Mack as general production superintendent for Sunray and also has been named a vice president.

H. F. MACK

J. K. ELLIS

Shifts

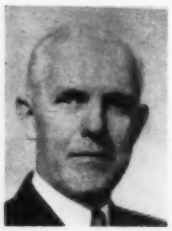
T. B. Watson, superintendent, Helmerich & Payne, Sublett, Kans., to Oklahoma City; **E. L. Smart,** superintendent, Stanolind Oil & Gas Co., Medicine Lodge, Kans., to Kingman, Kans.; **L. G. Kline,** superintendent, Dow Chemical Co., Torrance, Calif., to Gardenia, Calif.; **S. S. Gifford,** superintendent, Rocky Mountain Drilling Co., Long Beach, Calif., to Montebello, Calif.; **Mitt Dowlen,** engineer, Stanolind Oil & Gas Co., Bishop, Tex., to Woodsboro, Tex.; **Aultman T. Smith,** superintendent, Moutray Oil Co., Hawley, Tex., to Abilene, Tex.; **Marvin E. Hairgrove,** geologist, Humble Oil & Refining Co., Lolita, Tex., to Waynesboro, Miss.; **J. P. Lea,** engineer, Phillips Petroleum Co., Borger, Tex., to El Dorado, Ark.; **Thomas J. Jeffrey,** engineer, Atlantic Refining Co., Dallas to Magnolia, Ark.; **Lloyd O. Zapp,** engineer, Humble Oil & Refining Co., Houston to Corpus Christi; **A. L. Aulenbacher,** engineer, Gulf Oil Corp., Kilgore, Tex., to Segno, Tex.; **Gene E. Abernathy,** engineer, Phillips Petroleum Co., Odessa, Tex., to Eureka, Kans.; **Robert B. Wilkins,** engineer, Phillips Petroleum Co., Phillips, Tex., to Austin, Tex.; **W. T. Ilfrey,** engineer, Humble Oil & Refining Co., Crowley, La., to Franklin, La.; **Vernon T. Leesing,** engineering, Phillips Petroleum Co., Bartlesville, Okla., to Ferguson, Mo.; **T. M. Kennington,** superintendent, Champlin Refinery, Enid, Okla., to Breckinridge, Okla.; **J. H. McQuown,** engineering, Shell Oil Co., Inc., Oklahoma City to Caribbean Petroleum Co., Maracaibo, Venezuela; and **T. L. Regan,** superintendent, Stanolind Oil & Gas Co., Tulsa, to Oklahoma City.

Equipment Men in the News

Charles Cox New President Of Carnegie-Illinois

Benjamin F. Fairless, president of United States Steel Corp., announces that Charles R. Cox, last week became president of Carnegie-Illinois Steel Corp., succeeding J. Lester Perry, who has been named assistant to president of U. S. Steel Corp. of Delaware. Cox has been president of National Tube Co., another U. S. Steel subsidiary, since March 1943. Joining the National Tube Co. as general superintendent of Ellwood Works in 1934, Cox's rise in that company was rapid. In 1936, he was made vice president in charge of operations; in 1941, executive vice president, and in 1943, was elected president of National Tube.

CHARLES R. COX



J. LESTER PERRY

Industrial Engineering Merged With H. C. Price

H. C. Price, president of the H. C. Price Co., has announced the merger of Industrial Engineering Co. with the Price company; also that the company has been incorporated whereas it formerly was a partnership. In addition to its pipe-line construction activities, the Price company is now the manufacturer and distributor of Somastic pipe coating in states east of the Rocky Mountains. Pipe-line construction operations and the Somastic coating operations will be performed under two separate divisions of the company.

Hercules Moves Houston Office

Hercules Supply Co. of Houston announces the removal of their general offices and warehouse from 3130 Navigation Boulevard to their recently constructed building and warehouse at 6940 Clinton Drive.

Timken Advances Wagenhals

R. E. Wagenhals, formerly quality control engineer, has been appointed director of quality control for all bearing divisions of The Timken Roller Bearing Co., according to a recent announcement by company officials. He will coordinate all quality control activities involved in the manufacture of Timken Bearings.

Vernon Names Distributor

Vernon Tool Co., Ltd., announces the appointment of Robert V. Fulkerson Co. as California distributor of its oil-field products. The Fulkerson company will offer complete sales and service coverage throughout the state with representatives in Los Angeles, Ventura, and the San Joaquin Valley.

Youngstown Opens New Office

A new district office was established August 1 at New Orleans, La., by The Youngstown Steel Products Co. which represents The Youngstown Sheet and Tube Co., Walter E. Watson, vice president of the sheet and tube company, has announced. New Orleans formerly was a sub office under Atlanta, Ga. The office is at 520 Whitney Bldg. O. B. Ewing, who has been in charge of the New Orleans office, becomes district sales manager for that area.

Continental Moves District Office to Midland, Tex.

The Continental Supply Co.'s West Texas-New Mexico district office has been moved from Odessa to Midland according to an announcement released by the company's general offices in Dallas. The office is under the management of W. T. (Matt) Hays, assistant district manager. Personnel at this point will include Charles R. Pierce, sales engineer, recently discharged from the military service.

Peters Heads Sales of Jessop Steel Division

Joseph N. Peters has been named manager of the carbide and cast alloy division of Jessop Steel Co., Washington, Pa. He first joined the company in September 1945.

Flannery Joins Hendy Sales Department

C. A. FLANNERY

Charles A. Flannery, former colonel in the Corps of Engineers, has joined the Joshua Hendy Iron Works, Sunnyvale and Torrance, California, as manager of general products sales, according to announcement made by Harry C. Gunetti, general manager. Flannery, prior to the war, was sales manager of plate fabrication for Consolidated Steel Corp. and vice president and West Coast manager of Industrial Engineering Co. In his new position at Hendy, Flannery will supervise sales of hydraulic and mining equipment, valves, gears, and all kinds of special custom-built machinery. He will assist Cliff Patch, recently appointed sales manager, western division.

Wilson Appointed Chief Engineer For Maloney-Crawford

Sam A. Wilson has been appointed chief engineer for the Maloney-Crawford Tank & Manufacturing Co., Tulsa, according to O. W. Maloney, head of the tank firm. As chief engineer for Maloney - Crawford, Wilson will be in charge of equipment designing, with emphasis on separators, heaters and treaters.

SAM A. WILSON

Hovey Becomes Vice President

Waldo C. Hovey has been elected vice president in charge of research and development of The Harshaw Chemical Co., according to an announcement by President W. J. Harshaw. He is assuming his new duties at once.

Cameron Iron Receives Navy Ordnance Award

Cameron Iron Works, Inc., of Houston, Texas, and 15 of its officials and employes have received the Navy Ordnance Award for development and production of naval ordnance during the war. The awards for exceptional and meritorious service rendered to the United States Navy were presented at Ye Old College Inn, Houston.

Shown here at the presentation are (left to right): Ralph McCullough, secretary and treasurer of Cameron Iron Works, Inc.; Herbert Allen, vice president in charge of engineering and manufacturing; Captain A. D. Blackledge, administrative officer, U. S. Naval Gun Factory; and Edmond L. Lorehn, vice president and general manager.

Heads Buffalo Office

T. F. DeNormandie has been named branch manager of the Buffalo office of Jessop Steel Co., Washington, Pa., according to a recent announcement by T. W. Pennington, vice president in charge of sales. His offices are at 1015 Liberty Bank Building. DeNormandie has been associated with Jessop for the past 10 years in various departments, including production, sales, and the sheet and plate division. During the latter part of the war, he was in charge of light armor-plate production and sales.

Chicago Office Opened

Lukens Steel Co. and subsidiaries, By-Products Steel Corp. and Lukenweld, Inc., will open a district sales office in the McCormick Building, 332 South Michigan Avenue, Chicago, according to an announcement by J. Frederic Wiese, vice president in charge of sales. The office will handle most of the territory formerly served by A. M. Castle & Co., sales representative. The new office will be under the management of John H. Faunce, Jr., who has recently been released from Naval service.

Cromley Heads Factory Branch

Hercules Motors Corp., Canton, Ohio, announces the opening of a direct factory branch on the West Coast to broaden its program of supplying engines, power units and replacement parts to users, manufacturers and dealers throughout the western part of the country.

W. W. Cromley, vice president in charge of West Coast operations, is located in Los Angeles and is in direct charge of Hercules activities west of the Rocky Mountains.

Straughan Joins Midwestern

Midwestern Engine & Equipment Co., Inc., announces the employment of Clement F. Straughan as parts and service manager for their office and warehouse located at 105 North Boulder, Tulsa. Straughan recently returned from the Army Air Forces.